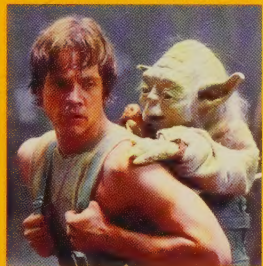
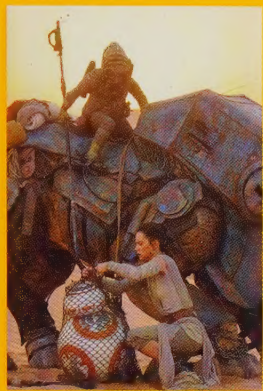


A CINEMAGIC BOOK

THE MOVIEMAKING MAGIC OF

STAR WARS™

CREATURES + ALIENS



MARK SALISBURY

THE MOVIE MAKING MAGIC OF

STAR WARS™

CREATURES + ALIENS

WRITTEN BY MARK SALISBURY



ABRAMS BOOKS FOR YOUNG READERS
NEW YORK

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And, finally, a massive "without whom" to both George Lucas for dreaming up this universe in the first place and the many talented filmmakers, artists, and technicians who have helped bring his vision to life.

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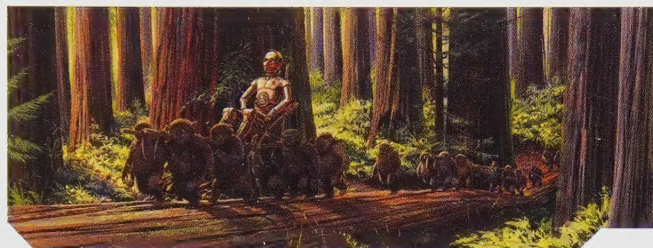
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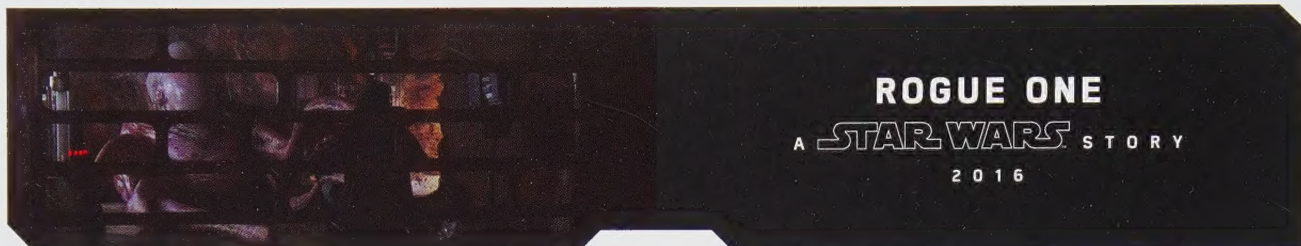
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MOVIES, MONSTERS, AND MAGIC



Dennis Muren, Phil Tippett, and Michael Pangrazio with stop-motion Tauntaun model

The *Star Wars* saga is filled with strange and unusual creatures—from the aquatic Admiral Ackbar to wise, old Yoda—with hundreds of bizarre aliens of all shapes and sizes in between. But the creatures and aliens of *Star Wars* wouldn't exist without the creatures and aliens that came to the big screen before them. In fact, special effects, strange aliens, and science fantasy films are almost as old as the movies themselves.

In 1902, Georges Méliès, the man now known as the father of special effects, created the silent film *A Trip to the Moon* and forever changed the movie-going experience. Turn-of-the-century audiences had never seen such amazing spectacles, and when they saw explorers rocket to the moon—and hit the man in the moon square in his eye—they were mesmerized. (Remember, cars were only first invented about fifteen years earlier, so the idea of rocketing to the moon really *was* science fiction!)

By combining tricks of the stage and theater, such as exaggerated makeup, painted backgrounds, and magic tricks, with camera techniques, such as fast and slow motion, double exposures, and forced perspectives, Georges Méliès introduced special effects to cinema, and the world has never been the same. Méliès also created the very first effects shop to work on his films. Located in Paris, it was a precursor to what George Lucas would do decades later with Industrial Light and Magic in Northern California.

While Méliès continued to make groundbreaking films in France, German filmmaker Fritz Lang created *Metropolis* in 1927. Considered a landmark science fiction film for its futuristic look and design—its female robot bears a strong resemblance to C-3PO—this silent film also furthered Méliès's special-effects techniques. Lang used effects, including miniatures, a camera on a swing, and mirrors, that created the illusion of actors on a miniature set.

These did not go unnoticed by filmmakers around the world.

In America, Willis O'Brien pushed the field forward by combining stop-motion animation with live actors, and he brought dinosaurs back to life in 1925 with *The Lost World*. O'Brien would go on to perfect this technique in 1933 with *King Kong*, thereby cementing his reputation as the father of stop-motion animation. O'Brien, in turn, influenced (and taught) Ray Harryhausen, whose stop-motion animation in *The 7th Voyage of Sinbad* (1958) and *Jason and the Argonauts* (1963), among others, directly influenced Phil Tippett, whose work on the tauntauns in *The Empire Strikes Back* relied on the same techniques that both Harryhausen and O'Brien once employed.

On the makeup effects side, silent film star Lon Chaney used elaborate makeup effects to change his appearance to become the Hunchback of Notre Dame and the Phantom of the Opera. His artistry earned him the nickname "The Man of a Thousand Faces."

In the 1930s and '40s, Jack Pierce both simplified and advanced Chaney's techniques when he created the iconic makeups for Frankenstein's monster, the Mummy, and the Wolf Man for Universal Studios. Incidentally, the latex appliances that are currently found in most Halloween stores are far more advanced materials than what Pierce had to work with, yet Pierce's creations are still the most well-known incarnations of these famous film characters—a testament to the design (and quality) of his monster movie makeups.

And it was those monsters that influenced Bud Westmore and Jack Kevan, who created what at the time was considered the best "monster suit" in the business in 1954's *The Creature from the Black Lagoon*. The Gamorrean Guards from *Return of the Jedi* and Unkar Plutt from *The Force Awakens* are

just two of the many modern "monster suits" used in *Star Wars*.

Likewise, it was John Chambers whose astounding makeups for the emotive, talking simians in *Planet of the Apes* (1968) and its sequels led the way for Stuart Freeborn to create their cousin of sorts with Chewbacca the Wookiee in 1977. And Dick Smith, the man responsible for the makeup in *The Godfather* (1972) and *The Exorcist* (1973) among other films, developed new techniques that his eventual protégé, Rick Baker, put into practice when he was called on to help create new and bizarre aliens for the cantina scene in *A New Hope*.

These films—and these artists—had an indelible impact on special effects, makeup effects, and science fantasy films, but they were just *some* of the influences on the behind-the-scenes artisans and technicians who worked on the original trilogy of *Star Wars* films.

A New Hope, *The Empire Strikes Back*, and *Return of the Jedi* pushed the special-effects industry forward by leaps and bounds, as did the Prequel trilogy that followed in the 1990s. The creation of special effects—and, in this specific case, the creation of creatures and aliens—is the cyclical, ever-expanding creation of art itself. In other words, it's moviemaking magic.

And now, *The Force Awakens*, *Rogue One*, *The Last Jedi*, and *Solo* will push the industry forward once more and inspire a whole new generation of artists, filmmakers, and fans.

I hope this book is also inspirational. I hope it entertains and educates readers of all ages about filmmaking—and about the magic and monsters of *Star Wars*.

Thanks for reading, and may the Force be with you.

Michael Siglain
Creative Director, Lucasfilm Publishing

A LONG TIME AGO . . .



In a land not so far away, a man named George Lucas made movie history. He wrote and directed *Star Wars*, a space adventure filled with epic battles, faraway planets, and alien creatures that feel as realistic as anything here on Earth. Today we take this moviemaking magic for granted, but when Lucas was first making *Star Wars*, the special effects technology needed to bring it to life didn't exist. It took crews of talented, creative people years of hard work to bring Lucas's vision to the screen. To make the impossible possible.

In the years that followed the release of *Star Wars* (later renamed *Star Wars: Episode IV A New*

Hope), technology became more advanced, and Lucas was able to realize even wilder dreams. The later films in the *Star Wars* saga represent special effects and creature-making achievements that surpassed expectations and set the standard for every movie epic to come.

You hold in your hands a behind-the-scenes look at the creatures and aliens of the *Star Wars* universe. You'll meet concept artists, creature supervisors, and legendary makeup artists. Through their own words and amazing photos, sketches, and concept art, you'll see how they took creatures like Chewbacca and Jabba the Hutt from ideas to film.

LET'S EXPLORE HOW A GALAXY FAR, FAR AWAY CAME TO LIFE!

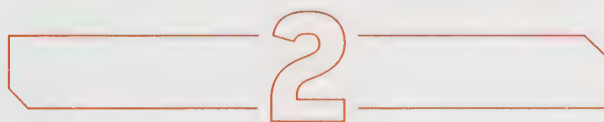
MAKING MOVIE MAGIC

THE BASICS

THE PROCESS OF
MAKING A MOVIE IS DIVIDED
INTO THREE PHASES:



PREPRODUCTION includes developing and writing the script, casting actors, hiring crew members, scouting locations to film, and designing and building costumes, sets, and creatures.



PRODUCTION refers to the actual filming, either at a faraway location or on a movie set (a large, hangar-like structure usually located on a movie studio property). The cameras roll, the actors say their lines, and any practical effects are in place. This phase is also referred to as principal photography.



POSTPRODUCTION encompasses everything left to do once filming has finished or “wrapped.” This includes editing (selecting the scenes and putting them together to tell a story), sound editing and design (selecting and mixing the dialogue, music, and special audio effects), and visual effects, among other things.

KEY TERMS:

VISUAL EFFECTS are all of the visual movie elements that have to be created, either in preproduction or postproduction.

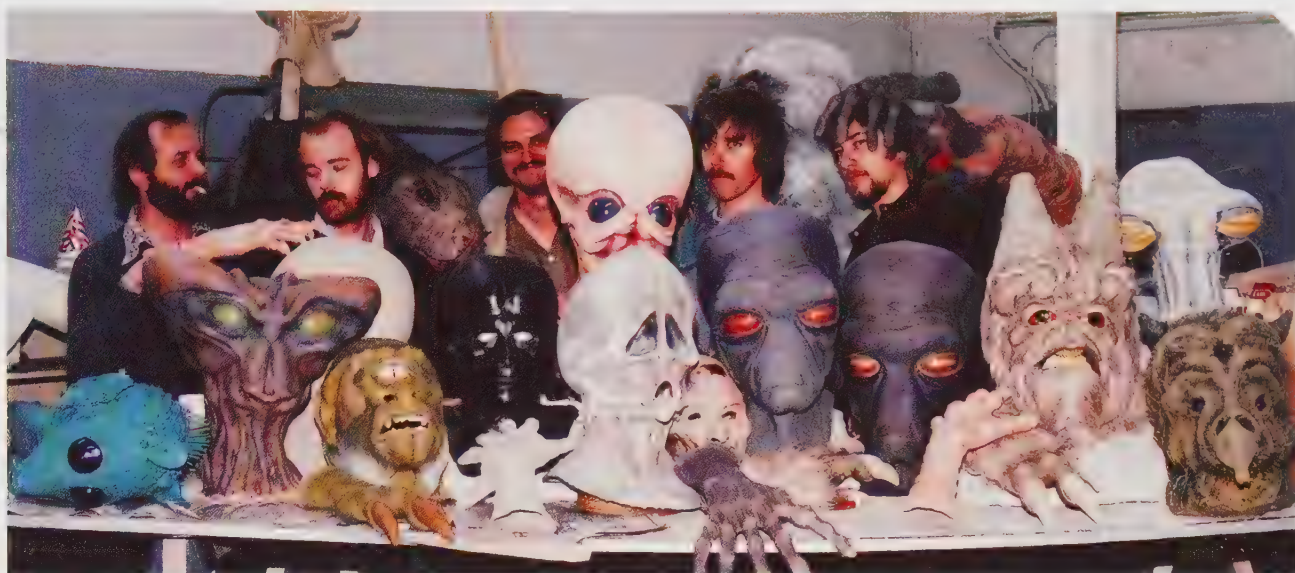
PRACTICAL EFFECTS are physical rather than computer generated. They can be anything from simple props to full-blown creatures that move through a scene. They are filmed on set with the actors. Practical effects include puppets, prosthetic makeup, and animatronics.

ANIMATRONICS refers to the use of robotic devices to portray human, animal, and even alien characters! Animatronic devices can be powered by pneumatics (air or gas), hydraulics (liquids), or electrical means, and their movements are controlled by computers, people, or a combination of both.

SCULPTS, MOLDS, AND CASTINGS are used to create everything from creatures to prosthetic makeup. A mold is a hollowed-out shape (think of a cake mold or ice tray). Molds are often filled with liquids that harden into three-dimensional shapes called *casts*. Casts made of parts of the body are called *lifecasts*.

CASTING can also be used to make aliens and other creatures that don't exist. In those cases, a sculpture (or sculpt) has to be created before a mold can be made. As long as you have something solid to work with, you can make a cast of anything!

PROSTHETIC MAKEUP is the bits and pieces (called *prosthetics*) added to an actor's face to significantly change his or her appearance. Prosthetic



Star Wars makeup artist Rick Baker (far right) and his team with their monster masks

makeup is often created through sculpting, molding, and lifecasting techniques.

COMPUTER-GENERATED IMAGERY (CGI or CG) is a type of special visual effect created by a computer. The first 3-D computer images appeared in *Tron* (1982), *The Last Starfighter* (1984), *Young Sherlock Holmes* (1985), and *Willow* (1988). But it wasn't until the digital dinosaurs in *Jurassic Park* (1993) that CGI was deemed capable of creating photorealistic creatures.

STOP-MOTION or stop-frame animation is one of the most beloved of all special effects techniques. It's also one of the oldest, dating back to the earliest days of movies. In stop-motion animation, an object, puppet, or person is photographed, moved slightly, photographed again, moved, photographed, and so on, one frame at a time. When the individual frames are played back the object appears to move!

Stop-motion models are typically built over metal skeletons (or armatures) that allow them to be posed easily and moved between frames. Willis O'Brien used stop motion to help create the giant gorilla in *King Kong* (1933). But it was Ray Harryhausen, who

popularized stop motion for generations of moviegoers with his stunning work in such classics as *The 7th Voyage of Sinbad* (1958), *Jason and the Argonauts* (1963) and *Clash of the Titans* (1981). More recent examples of stop-motion animation include *The Nightmare Before Christmas* (1993), *Coraline* (2009), and *ParaNorman* (2012).

MOTION CAPTURE is an effect in which an actor's movements are digitally recorded, then combined with character animation to create the final effect.

MAQUETTES are small-scale, three-dimensional clay models used for reference. They are sometimes scanned and then turned into CG creatures and characters as well.

STORYBOARDS are drawings, like comic book panels, in which complicated sequences are broken down frame by frame to help filmmakers plan their shots.

ILM (INDUSTRIAL LIGHT & MAGIC) is the motion picture visual effects company founded by George Lucas in 1975 to create the elaborate special effects needed for the *Star Wars* films.





STAR WARS

E P I S O D E I V

A NEW HOPE

1 9 7 7

When George Lucas was a kid growing up in Modesto, California, he liked going to the movies. One of his favorite film series was the continuing story of Flash Gordon, an adventure hero who traveled to strange worlds and met amazing new creatures. Each short film ended with a cliff-hanger, so young George waited for a new episode each week to see what happened next. As an adult, Lucas dreamed of creating movies that would give audiences the same feeling the Flash Gordon films gave him as a kid. He wanted to create a science fiction epic that would leave people wanting more.

In the early 1970s, Lucas began writing the screenplay for *Star Wars*. He imagined a world full of human, robotic, and alien characters, but he needed someone to help him figure out what they would look like. He hired Ralph McQuarrie, an experienced illustrator who designed movie posters, to produce a series of paintings to bring the world of *Star Wars* to life. McQuarrie would go on to shape the look of *Star Wars* as we know it.

With Lucas's script and McQuarrie's paintings—the first of which featured the villainous Darth Vader, the Wookiee Chewbacca, droids R2-D2 and C-3PO, and the desert planet of Tatooine—*Star Wars* sold to Twentieth Century Fox. Now that Lucas had a film studio behind his movie, he had to figure out how to make it.

To create some of the exotic cast of *Star Wars* creatures, Lucas turned to Stuart Freeborn, a legendary English makeup artist who had been working in film since the 1930s. Freeborn used every trick at his disposal to produce the wide variety of creatures and aliens Lucas imagined—from people in suits to prosthetic makeup, from pull-on masks to puppetry.

"His *Star Wars* creatures may be reinterpreted in new forms by new generations," says Lucas of Freeborn, "but at their heart, they continue to be what Stuart created for the original films." And they were unlike anything else seen in movies at the time."

"Cantina," March 6, 1975, production illustration by Ralph McQuarrie

BANTHA

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode VI Return of the Jedi*,
Star Wars: Episode I The Phantom Menace, *Star Wars: Episode II Attack of the Clones*
MOVIEMAKING MAGIC METHODS: *Costume, CGI*

First seen in *A New Hope*, ridden by Tusken Raiders, the mammoth-like bantha was actually a trained female Asian elephant named Mardji, a resident of Marine World Africa. For her role as a bantha, the 8,500-pound Mardji wore a head mask made from chicken wire sprayed with foam. Her curved horns were made from flexible ventilation tubing, and her shaggy coat was constructed from palm fronds.

Mardji's scenes were shot in Death Valley, California, during postproduction. She would frequently try to shed her costume, making the already difficult task of working in the desert heat even more grueling.

ILM later created digital banthas for the Prequel trilogy.

FORCE FACT

Because the production could only afford one elephant, for scenes with two banthas, Mardji was filmed twice and ILM put the images together using a special optical effect.



1 Mardji in bantha costume on set



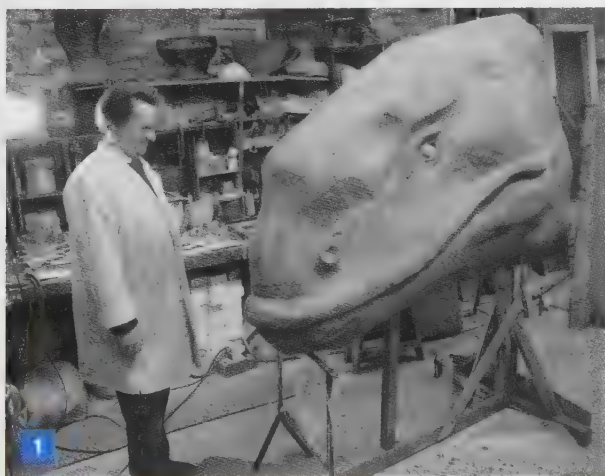
DEWBACK

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode VI Return of the Jedi*,
Star Wars: Episode I The Phantom Menace, *Star Wars: Episode II Attack of the Clones*

MOVIEMAKING MAGIC METHODS: Puppet, CGI



The reptilian dewback—a transport creature native to Tatooine—was a puppet created from the body of a stuffed rhinoceros. The head and tail were made from fiberglass covered with a latex skin. Lucas was always very frustrated by the way the original dewback puppet moved. “It was a very crude thing,” he recalls. “He had a big stick in his head that somebody could move back and forth. It was basically a big rubber statue.” For the special edition re-release of *A New Hope*, Lucas added CG dewbacks to both the desert and Mos Eisley sequences.



- 1 Fred Pearl, whose model shop sculpted the dewback
- 2 Dewback and stormtrooper patrol on set

FORCE FACT

The majority of the Tatooine scenes were filmed in Tunisia, a country in Northern Africa. The original dewback puppet was abandoned in the Tunisian desert along with other large props, including the krayt dragon skeleton.

JAWAS

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode VI Return of the Jedi*,
Star Wars: Episode I The Phantom Menace, *Star Wars: Episode II Attack of the Clones*

MOVIEMAKING MAGIC METHOD: *Costume*



Also native to the desert planet of Tatooine, the three-foot-tall Jawas survive by scavenging scrap metal and droids.

They were initially designed with prominent, rodent-like facial features. But costume designer John Mollo, who was responsible for their final look, decided to hide their entire faces beneath heavy hoods, with only their glowing yellow eyes visible.



"They were supposed to look like little rats, sort of grimy and filthy," he recalls. "George [Lucas] produced a prototype that he subsequently felt was too theatrical. So we pulled it back to just a black stocking mask and these eye-bulbs, a little brown cloak with a . . . hood and a scarf. Then we'd put other bits and pieces on them the day of shooting to make them look a bit more formidable."



1 Jawa concept sketch by John Mollo

2 Jawa in costume on set

FORCE FACT

The Jawas' dialect was actually sped up words and phrases in Zulu, the most widely spoken native language in South Africa.

TUSKEN RAIDERS

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode I The Phantom Menace*,
Star Wars: Episode II Attack of the Clones
MOVIEMAKING MAGIC METHOD: *Costume*



Another species native to the hostile Tatooine desert is the Tusken Raiders. They survive the fierce heat by wearing heavy cloth robes, protective eye gear, and breathing masks.

Concept artist Ralph McQuarrie designed the Tusken Raiders, also known as Sand People. "I thought they should have goggles on because they have some sort of vision problem, the result of their species mutation," he reveals. "The mouthpiece is a filter because of the constant sandstorm; the little tank underneath is filled with gas or a chemical as part of their life-support system."



The Tusken Raiders' leader who attacks Luke when he's out searching for R2-D2 in the Jundland Wastes was played by the film's veteran stunt coordinator Peter Diamond, who couldn't see much once he was in costume.

- 1 *Character sketch of Tusken Raider by Ralph McQuarrie*
- 2 *Peter Diamond in his Tusken Raider costume on set*

FORCE FACT

The fearsome bellow that the Tusken Raider leader sounds during the attack was taken from recordings of donkey brays remixed by sound designer Ben Burtt.

CANTINA CREATURES

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode VII The Force Awakens*, *Rogue One: A Star Wars Story*

MOVIEMAKING MAGIC METHODS: Prosthetic makeup, Puppetry, Costume



When people think of *Star Wars*, one of the first things they think of is the cantina sequence in *A New Hope*. Luke and Obi-Wan meet Han and Chewie for the first time and hire the *Millennium Falcon* to take them to Alderaan.

A Western movie-style saloon, the cantina is filled with a wild array of weird and wonderful aliens from all over the galaxy—not all of them friendly!

To create this collection of creatures, George Lucas initially turned to Stuart Freeborn, who, together with his team, pulled out all the stops to turn more than forty actors and extras into a gaggle of space pirates, pilots, and peasants, using every method available from full-head masks to fake noses and false teeth. But Freeborn fell ill, and despite the hard work of his crew, he was not able to complete the various creatures to Lucas's liking.

Lucas filmed as much of the cantina sequence as he could, determined to reshoot at a later date.

After filming finished, Lucas hired makeup artist Rick Baker, who was just beginning his career in creature effects, to head up a crew to create a host of new creatures that would be intercut with the existing footage. (Rick would go on to win seven Academy Awards for Best Makeup and Hairstyling—including the inaugural award in 1981.)

"We only had six weeks and a limited budget, so we could not do anything outstanding or complicated," says Baker. "We set up shop, made thirty aliens."

The new creatures included the now legendary seven-piece **Cantina Band** (officially named Figrin D'an and the Modal Nodes). Each band member's head was cast from



the same sculpt but had subtle variations in their paint-work. Their hands were also unique. Each head mask incorporated one small air hole for the actors to breathe through. Unfortunately, it was also the mouth, which often was covered by an instrument. When the performers started to collapse, producer Gary Kurtz quickly stepped in and used a box cutter to create air holes in the masks.

- 1 *Concept sketches for Cantina creatures by John Mollo*
- 2 *Creatures and aliens on set, ready for Cantina scenes to be shot*

FORCE FACT

The Cantina Band members were portrayed by ILM employees who mimed playing their heavy, specially made instruments to an old Benny Goodman tune called "Sing, Sing, Sing."



1



2



The first alien to appear in the cantina sequence is **Hem Dazon, aka T-Head**. His eyes sparkle because of the silver flashlight in the back of his head.

Momaw Nadon, aka Hammerhead, was a foam and latex puppet with eye lights and a mechanism to make the eyes blink. On set, one crew member, John Berg, operated Hammerhead's head, while another, Phil Tippett, lay on the floor operating cable controls for the eyes.



Ponda Baba, aka Walrus Man, was a latex mask with acrylic tusks. He recently made a cameo in 2016's *Rogue One* on Jedha alongside fellow smuggler Dr. Evazan.





The Duros alien species, known on set as **Goggle-Eyes**, were a bald, bug-eyed pair that were created with one sculpt, cast twice. One of the aliens wore a space suit previously worn by one of the space-and-time-traveling chimps in *Escape from the Planet of the Apes* (1971). If you look closely, only one has alien hands; the other's hands are definitely human.

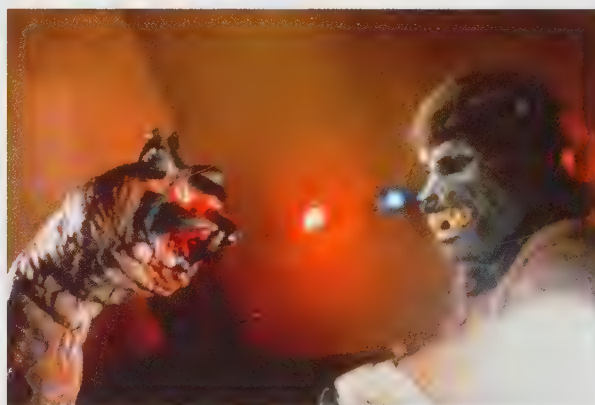


Trinto Duaba, aka Terminal Man, is named for the electrical terminals on his head. He began life as a slip-on mask originally intended to be a Frankenstein's monster mask. A makeup-based Trinto Duaba also showed up in 2015's *The Force Awakens*.

The fluffy, four-eyed **Muftak** was nicknamed "Spider Man" on set because of his resemblance to a spider (and not to a certain superhero). The costume had no legs, which is why he's only seen sitting.

1 *Hammerhead concept art by Ron Cobb*

2 *Muftak concept art by Ralph McQuarrie*



Dice Ibegon was a claw-headed lamprey-like creature. It had tubes inside its puppet body to carry fake blood that was supposed to dribble out of its mouth on cue. In the end, Lucas shot a take without blood and that was the one he used.

Lak Sivrak, aka Wolfman, was an unnamed extra in the original release of *Star Wars*, but was replaced in the 1997 Special Edition with Ketwol, a tusked alien that was a puppet and a mask.

GREEDO

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode VI Return of the Jedi*
 MOVIEMAKING MAGIC METHOD: *Costume*



Lucas's favorites of Freeborn's cantina aliens were four green-skinned creatures dubbed "Martians" by the crew, now more commonly known as Rodians. Loosely based on an alien Freeborn made for a commercial, the Rodians came alive via simple slip-on masks with added snouts, ears, antennae, and warts. Because Freeborn thought the creatures would only be used in the background, he didn't give the masks moving parts.

One of the four Rodians, later named Greedo, wasn't expressive enough for Lucas, and he worried that the hands couldn't grasp properly. Lucas had Rick Baker's team add articulation to one of the Martian masks so his speech and facial expressions looked more realistic. However, the mechanism failed on set, and the actress playing Greedo had to bite on a clothespin to open and close the mouth.

Shots of the new, improved Greedo were then edited into the preexisting footage. "You would swear it was all done at the same time," says Baker. "That shows you George Lucas knows what he's doing."



- 1 "Cantina Creature Head," concept sketch by Ralph McQuarrie
- 2 The notable bulbous eyes being applied to a dummy
- 3 George Lucas on set with Greedo





CHEWBACCA

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode V The Empire Strikes Back*,
Star Wars: Episode VI Return of the Jedi, *Star Wars: Episode III Revenge of the Sith*,
Star Wars: Episode VII The Force Awakens, *Star Wars: Episode VIII The Last Jedi*, *Solo: A Star Wars Story*
MOVIEMAKING MAGIC METHOD: Costume

Chewbacca, Han Solo's loyal friend and copilot of the *Millennium Falcon*, is one of the most endearing and enduring characters in all of *Star Wars*.

A Wookiee warrior from the planet Kashyyyk, Chewbacca, affectionately known as "Chewie," went through several incarnations before he became the furry sidekick we know and love.

George Lucas's original screenplay for *Star Wars* describes Chewie as "an eight-foot-tall, savage-looking creature resembling a huge gray bush-baby monkey with fierce baboon-like fangs . . . large yellow eyes dominate a fur-covered face. He is a two-hundred-year-old Wookiee and a sight to behold."

Famously, Lucas based this version of Chewie on his dog, an Alaskan malamute named Indiana (who also inspired the name of a certain movie archaeologist). "My dog used to ride on the front seat of my car. He was very large, and when he sat there he was bigger than a person."

To design Chewie, Lucas turned to Ralph McQuarrie, whose initial sketches were more lemur-like, before they evolved into the more familiar Wookiee with the dog-like mouth and nose.

But it was makeup supervisor Stuart Freeborn who had the final say over Chewie's look. "Chewbacca was a fascinating one," says Freeborn, "because he had to look



Sketches of Chewbacca by Stuart Freeborn

nice, though he could be very ferocious when he wanted to be."

Since Chewbacca was the first creature to be built, Lucas visited Freeborn's workshop daily to see how he was progressing. "I would go in there and push the nose around a little bit and push the chin up," Lucas recalls. "I kept pulling the nose out and pushing it back. It was difficult, because we were trying to do a combination of a monkey, a dog, and a cat."

Once the design was perfected, it was clear that Chewie would have to be played by a very tall man.

"When Peter Mayhew walked into George's office, [George] must have thought he'd won the lottery. 'Because here is a man who is seven foot three, has blue eyes that are much wider than our eyes . . . and he also has a very, very strong jawline,'" notes Neal Scanlan, creature



STAR WARS:

"CHEWBACCA"

Concept sketches

Ralph McQuarrie





supervisor on *The Force Awakens*, *Rogue One*, and *The Last Jedi*.

At the time, Mayhew's only previous acting experience was as a creature in *Sinbad and the Eye of the Tiger* (1977).

By chance, one of the *Sinbad* makeup artists was also working on *Star Wars*. "One of the makeup chaps [on *Sinbad*] forwarded my name to [Star Wars producer] Gary Kurtz when he found out what they wanted for the movie," says Mayhew. "Chewbacca was the only part I was offered, and I took it."

As Chewbacca, Mayhew wore a full-body suit made of mohair and yak hair, knit together by Freeborn's wife, Kay. "When you knit a suit like that, it has a weight and a feel which no other material will give to you," says Scanlan. "Stuart knew that. He did it to give this slightly weighted feel to Chewie—it allowed Peter to bend and run and do all sort of things."

Chewie's head was a foam latex and rigid foam mask. Each hair was sewn in one strand at a time. "Stuart also designed this lovely little mechanism so that when Peter opened his mouth, it automatically lifted up Chewie's top lips," says Scanlan. "That is part of how we perceive Chewie as talking."



1 Stuart Freeborn with Peter Mayhew and the finished Chewbacca head.

2 A foam-latex and rigid-foam mask was the base of Chewie's head before hair was glued to the face.



"I put that mask on and Chewie transformed *me*," says Mayhew, who has played Chewbacca in six films, up to and including *The Force Awakens*. (Joonas Suotamo was Chewie's double for *The Force Awakens* and took over the role from Mayhew for *The Last Jedi*.) "I transformed. The attitude was different. The walk was different. Chewie turned on. [He would] do the scenes."

When it came time to resurrect Chewbacca for *The Force Awakens*, Scanlan's team painstakingly re-created what Kay Freeborn had done almost four decades before—a fully knitted suit. Scanlan had initially tried to adopt a more up-to-date method using lycra covered in hair, but the suit wasn't successful.

"You don't mess with Chewie," Scanlan says. "There are certain things we consider to be hallowed ground, and Chewie is one of them."

BEN BURTT

SOUND DESIGNER



Ben Burtt's contribution to the *Star Wars* saga has been enormous. As sound designer from the very beginning, Burtt has provided everything from the hum of the lightsaber to R2-D2's beeps and whistles to Darth Vader's heavy breathing to Chewbacca's famous roar.

"George wanted an organic soundtrack [for *Star Wars*]," says Burtt, who went to the same film school as Lucas. "He wanted the spaceships, the weapons, the vehicles to sound as if they were real. Rather than go in the direction that many science fiction films had prior to *Star Wars*, he wanted the sounds of real motors, squeaky doors, and rusty hinges on the spaceship doors. He encouraged me to record and compile sounds from the real world rather than synthesized things. My first specific assignment was to develop the sound for Chewbacca."

Burtt collected many different animal sounds and combined them to create the voice of the Wookiee.

"It turned out to be bears, but also quite a number of other mammals," he recalls. "I went to Marineland of the Pacific [in Los Angeles County] and recorded walruses,

dolphins, and other animals. I went to different zoos and animal collections to record cats and birds."

From there, Burtt continued to develop the world as he heard it.

"Once I started on the Wookiee, I got a look at the script and began pulling out all of this other material. We had aliens, weapons, spaceships, environments. Essentially, I just took over the job of sound design, since I was the only one able to, at that point. I said, 'I'll start collecting and making sounds for everything.'"

And he's been making sounds for the *Star Wars* universe ever since.



DEJARIK

APPEARANCES: *Star Wars: Episode IV A New Hope*, *Star Wars: Episode VII The Force Awakens*, *Solo: A Star Wars Story*
 MOVIEMAKING MAGIC METHOD: Stop-motion animation



One of the most popular scenes in the original *Star Wars* takes place onboard the *Millennium Falcon*. In it, Chewbacca and R2-D2 play deejarik, or holochess, where the chess pieces are monsters.

George Lucas had originally planned to film the sequence using little people in costumes on a giant chessboard. But when another movie, *Futureworld* (1976), shot a similar sequence, Lucas decided he wanted something new.

ILM staffers Phil Tippett and Jon Berg had created a series of small clay monster models they thought would be used in the cantina scene. But when Lucas saw them, he thought they were just what he needed for a revamped version of deejarik. For the next two weeks, Tippett and Berg sculpted eight monsters using latex, foam rubber, plastic foam, and clay over ball-and-socket armatures.

The deejarik sequence was shot in five days using stop-motion animation.

Holochess proved such a hit with *Star Wars* fans that director J.J. Abrams decided to revive it for *The Force Awakens*. And in a further nod to Lucas's classic, Abrams decided that when Finn reactivated the game it should pick up exactly where it left off all those years before—with a creature called "Hunk" extracting revenge on the "piece" that threw him down.

To film the new sequence, Abrams approached the men who originally made the game. "The problem was, the characters we had made close to forty years ago were in a horrible state of disintegration," says Tippett. And they were hard to find. Four of the sculpted monsters turned up in the Lucasfilm archives, attached to a plaque Tippett and Berg had presented to Lucas in 1977. Another two now belonged to *Lord of the Rings* director Peter Jackson, but he provided Tippett with 3-D scans. Using original production photos, Tippett was able to reconstruct all eight pieces digitally. New monsters were cast from 3-D prints, this time from longer-lasting silicone.





DIANOGA

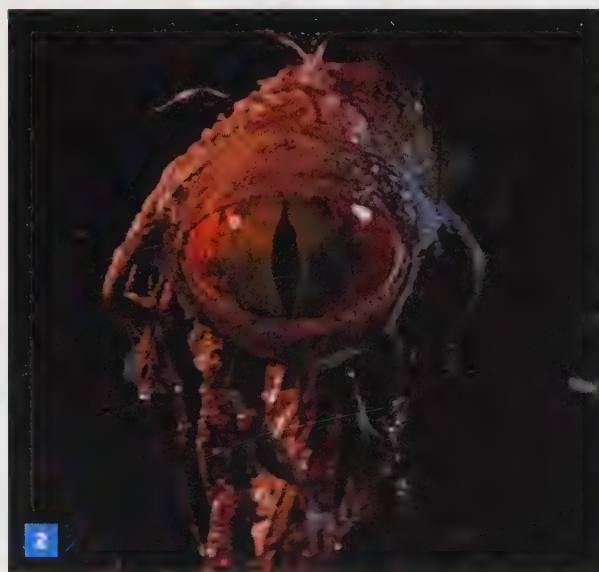
APPEARANCE: *Star Wars: Episode IV A New Hope*

MOVIEMAKING MAGIC METHOD: *Puppetry*



In *A New Hope*, Luke is pulled into the murky depths of the Death Star trash compactor by a one-eyed creature known as the dianoga. This creature was initially designed to be much larger and more frightening than it is in the final cut of the film.

A carnivorous cephalopod with tentacles, suckers, and a single eyestalk, the dianoga was, according to George Lucas, meant to be "a cross between a jellyfish and an octopus, a transparent muck monster which can take any shape." But due to budgetary issues, the dianoga wound up as a "one-eyed creature with tentacles." Phil Tippet created the dianoga's eyestalk while John Stears, in collaboration with Stuart Freeborn's makeup department, worked on the tentacles.



"They started constructing the dianoga out of this very heavy plastic, and it started to get very cumbersome and big," recalls Lucas. "It had to be run by ramjets [a kind of jet engine], which I didn't like, so I rejected the idea. And I kept rejecting things to the point where all we had left was a tentacle." The audience sees only a small piece of the creature; what lurks beneath the waters remains a complete mystery, adding tension to the scene.

- 1 Sketch for an early version of the dianoga by John Barry
- 2 The dianoga's eyestalk as seen in the Special Edition





STAR WARS™

EPISODE V

THE EMPIRE STRIKES BACK

1980

When George Lucas started work on *Star Wars: Episode V The Empire Strikes Back*, *Star Wars* had already become a worldwide sensation and the highest grossing film of all time.

Expanding the story of Luke, Leia, and Han, and the fight between the Rebellion and the evil Empire, *The Empire Strikes Back* represented an even greater moviemaking challenge.

There were more elaborate special effects, new worlds, and a host of new creatures, including the towering wampa and dinosaur-like tauntaun.

The biggest creature challenge in *The Empire Strikes Back*, however, proved to be the creation of Yoda. The ancient, wise, and diminutive Jedi Master would share a large amount of screen time with Luke as he trains Luke in the ways of the Force.

Yoda went through a number of different designs before finally being created as a hand puppet, voiced and operated by Frank Oz, known for his work with Jim Henson's Muppets.

With his distinctive manner of speaking—"Try not! Do, or do not. There is no try."—Yoda was an immediate sensation. He took on a life of his own, becoming completely real in the minds of audiences young and old.

Today, Yoda remains one of the most loved of all *Star Wars* creatures—a testament to the skillful collaboration of Stuart Freeborn, Frank Oz, director Irvin Kershner, and Mark Hamill, who starred opposite him as Luke Skywalker.

"Giant Worm," July 20–21, 1978, production illustration by Ralph McQuarrie



TAUNTAUN

APPEARANCE: *Star Wars: Episode V The Empire Strikes Back*
MOVIEMAKING MAGIC METHODS: Puppetry, Stop-motion animation



Ralph McQuarrie's concept sketches of tauntaun, from lizard to two-legged, furry creature

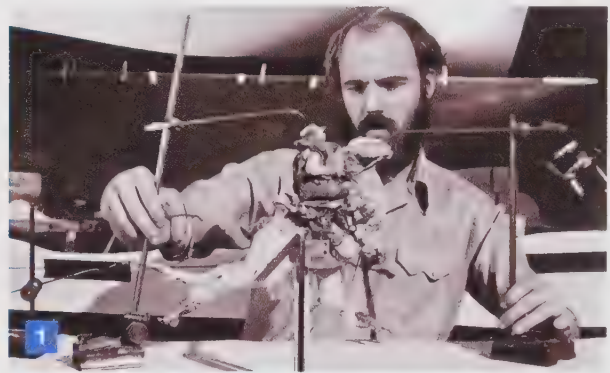
Originally designed as a cross between a tyrannosaur and a triceratops, in the *Star Wars* universe, the tauntaun is native to the ice planet Hoth. Two are ridden by Luke and Han across the vast snowy plains.

To bring the furry creatures—with their powerful legs, short arms, and claws—to life, George Lucas employed a variety of methods, from puppetry to stop-motion animation. For scenes in which the creature is ridden, Stuart Freeborn and special effects supervisor, Brian Johnson, built an eight-foot-tall animatronic tauntaun for the actors to sit on. For close-up shots, they created a series of tauntaun heads. One had a rigid skin with a basic moving mouth and eyes. Another had a soft foam latex face and additional cable mechanisms for a greater range of expression. Both had tubes that pumped gas from the nostrils to simulate breathing.

For shots of Han and Luke riding a full-length tauntaun, ILM built a series of foot-high stop-motion puppets from

foam latex and calf fur. These were animated on a tabletop snowscape. To move the puppets, the animators had to reach up through a trap door on the set's floor.

A motorized brace was used to move the puppets fractionally as each frame of film was shot. This helped to simulate "motion blur," so their movements read as more realistic to the human eye. This blurring was later dubbed "go-motion."



- 1 Phil Tippett with a model of a stop-motion tauntaun
- 2 Eight-foot animatronic tauntaun

FORCE FACT

The tauntaun's voice was concocted from a recording of an Asian sea otter that was pitched down slightly.

WAMPA

APPEARANCE: *Star Wars: Episode V The Empire Strikes Back*

MOVIE MAKING MAGIC METHODS: Costume, Puppetry

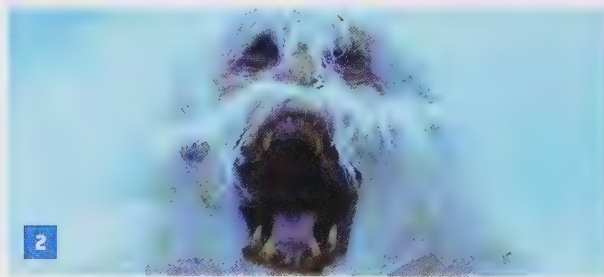


The wampa is the towering monster that attacks Luke and his tauntaun on Hoth. It was designed by Joe Johnston and built as a full-size suit by Stuart Freeborn.

The suit was made from a patchwork of sheep and goat skins, and it included a pair of giant boots attached to two-and-a-half-foot stilts. Worn by seven-foot-four actor Des Webb, the suit increased Webb's height to eleven feet. Unfortunately, the suit was cumbersome and heavy, and Web could only manage a few steps at a time before falling over in the snow.

Back in England, Freeborn revamped the suit, making slight changes to the design of the head and eyes. But George Lucas decided he wasn't happy with Freeborn's "cute" wampa. He asked Phil Tippett to create another version, and Tippett redesigned the creature to make it

more ferocious. He built a small wampa hand puppet with a mechanical mouth for two close-ups—when the beast attacks Luke on the tauntaun. Freeborn's team created a large wampa arm for on set and location work. A new, more-manageable wampa suit was created for the Special Edition.



- 1 *Stuart Freeborn with an early Wampa suit*
- 2 *Wampa hand puppet made by Phil Tippett*
- 3 *Full wampa costume worn by Des Webb on set*

FORCE FACT

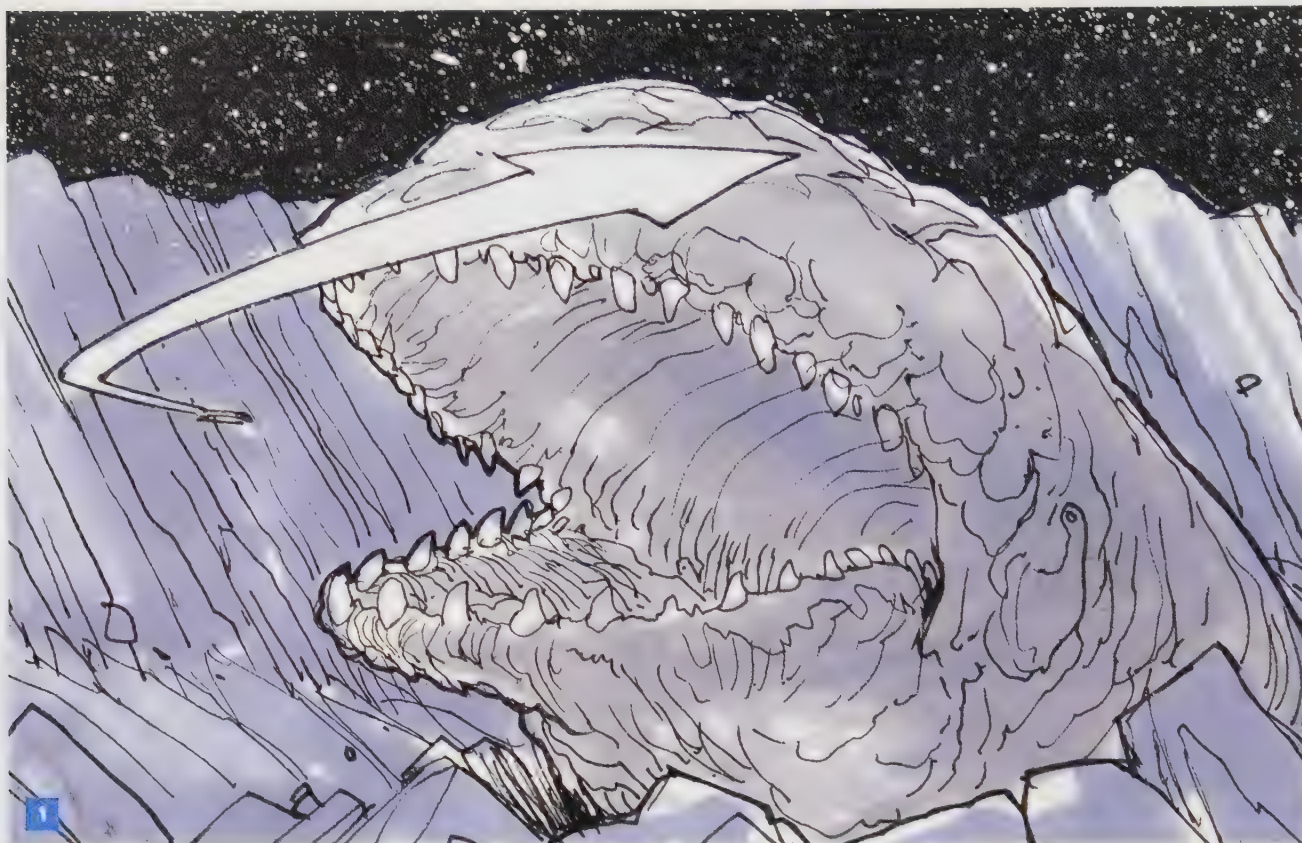
The wampa's roar was pieced together from the noises made by an elephant at Oakland Zoo mixed with the cries of a sea lion recorded at Marineland of the Pacific.



SPACE SLUG

APPEARANCE: *Star Wars: Episode V The Empire Strikes Back*

MOVIEMAKING MAGIC METHOD: Puppetry



When TIE fighters pursue the *Millennium Falcon* in *The Empire Strikes Back*, Han and Chewie land on an asteroid to escape. It turns out what they thought was a cave is actually the belly of an exogorth, or space slug!

The space slug's scenes were shot in several different ways. Scenes inside the belly of the beast, in which Han, Leia, and Chewie are attacked by the parasitic mynocks, were shot on a soundstage. Black plastic sheeting was laid on the floor, and black curtains were draped around the *Millennium Falcon*. Dry ice was used to create fog.

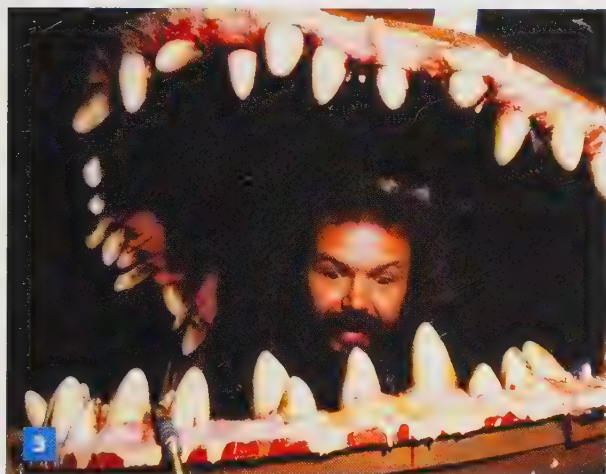
For shots of the *Falcon* escaping, ILM's chief model maker, Lorne Peterson, built a four-and-a-half-foot-long model of the exogorth's jaw and teeth. The teeth were around five inches high and crafted from plastic urethane, giving them a translucent, ivory quality.

Lastly, for the final chomp, Phil Tippett and Jon Berg built a small hand puppet so the space slug is revealed in all its monstrous glory. The puppet measured approximately thirty inches long by eleven inches wide and featured jaws that closed using a spring.



When the scenes were edited together, the result showed one giant creature, and one of the most iconic scenes in *The Empire Strikes Back*.

- 1 Storyboard image of the *Millennium Falcon* escaping a space slug by Joe Johnston
- 2 Model of the *Millennium Falcon* and cave miniature set
- 3 Lorne Peterson inside the mouth of the space slug
- 4 Hand puppet built for the final chomp!





YODA

APPEARANCES: *Star Wars: Episode V The Empire Strikes Back*, *Star Wars: Episode VI Return of the Jedi*,
Star Wars: Episode I The Phantom Menace, *Star Wars: Episode II Attack of the Clones*,
Star Wars: Episode III Revenge of the Sith, *Star Wars: Episode VIII The Last Jedi*

MOVIEMAKING MAGIC METHODS Puppetry, CGI



Small but incredibly powerful, and wise even beyond his many hundreds of years, Yoda was an immediate hit with audiences when he first appeared in *The Empire Strikes Back*.

George Lucas didn't want Yoda to look like he was played by someone in a costume, so he wanted Yoda to be very small—too small for a person to portray in close-up. At first, Lucas thought Yoda might be played by a monkey, and he briefly considered stop-motion animation.

Then Lucas had another idea. During the making of *A New Hope*, he had become friendly with Jim Henson, creator of the Muppets, and wondered if a hand puppet might be the solution. "I really admired the Muppets," Lucas recalls, "so I asked [Jim] if he thought we could . . . create a realistic-looking puppet. He thought it sounded exciting and . . . recommended Frank Oz to be the puppeteer. Said he's really the best."

Oz, who voiced and played Miss Piggy, Fozzie Bear, and others on *The Muppet Show*, signed on when he saw a drawing of Yoda. "As soon as I saw it I felt very strongly about the character, about his power, his wisdom, and his

humanity," he recalls. "I liked the paradox of a powerful, all-knowing fellow who looked old and weak."

To build Yoda, Lucas turned to makeup and creature designer Stuart Freeborn, who was already hard at work on *The Empire Strikes Back*. "Things were getting very tight with production due to start very soon," Freeborn recalls. "George Lucas came to my workshop one morning and asked if I could have a go at creating a design for this little fellow. The catch was that he needed to see it that afternoon, as he was flying back to the States."

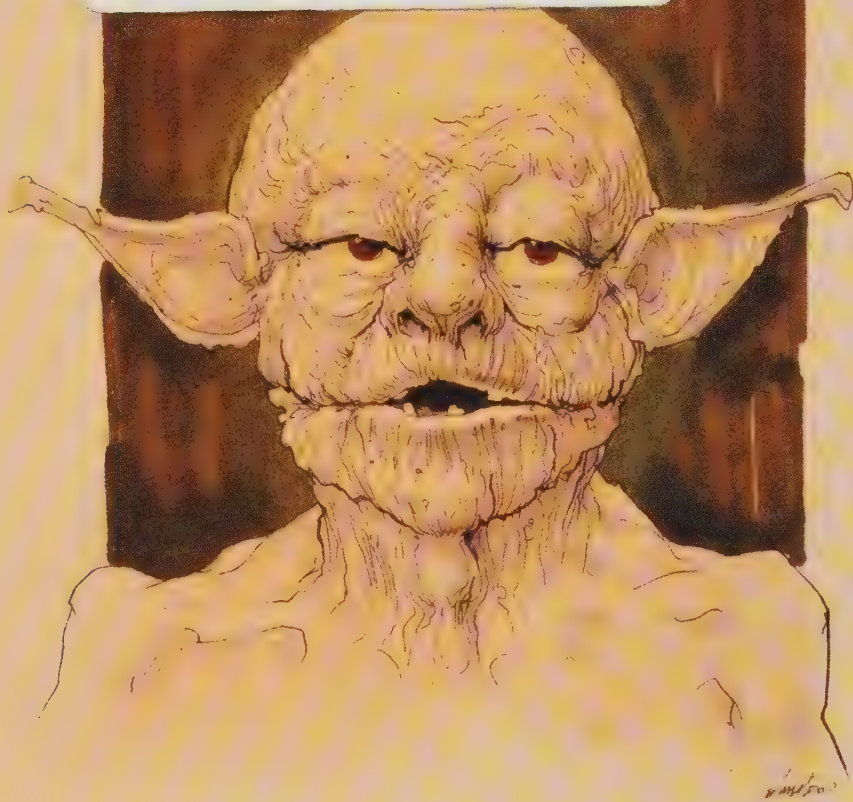
With such a tight deadline, Freeborn didn't have time to start from scratch. Instead he modified a clay sculpture that he'd been working on. "I added ridges, as George had described the character as very wise, and I felt that might indicate thought. I also gave the little fellow Einstein's eyes to really drive home the sense of intelligence. I wanted to give him a little mustache but it didn't seem right, somehow. I compromised by creating the shape of a mustache on his upper lip."

1 Production illustration by Ralph McQuarrie

STAR WARS:

"YODA"
Concept sketches

Joe Johnston





That afternoon, Lucas returned to see what the makeup artist had come up with. "I covered my eyes, convinced he would hate it," Freeborn remembers. "He looked at it very carefully and, as he did with Chewbacca, said, 'Yes! That's it.'"

Yoda's head and body were made of foam latex and had to fit Oz's hand perfectly. "My thumb would be his mouth and my middle finger on his brow," Oz explains. "My index finger, my fourth finger, is the upper palate, and the small finger really does nothing."

Only Yoda's eyes and ears were mechanical, controlled by a cable system that extended out of the puppet's back, and operated by Frank Oz and Kathryn Mullen (who also



performed Yoda's right hand) off camera. Wendy Froud, David Barclay, Mike Quinn, and David Greenaway assisted.

The Yoda puppet took a while to perfect. Freeborn's crew worked at all hours to get it finished on time, but when Yoda finally took center stage on his first day of

- 1 *Stuart Freeborn working on a clay sculpture to create Yoda.*
- 2 *Dennis Lowe, effects technician, working on animatronics inside Yoda puppet.*
- 3 *Irvin Kershner and Stuart Freeborn realized after the character was created that Yoda's features resemble Freeborn's.*





filming, it was a backup puppet that was used. "Because the hero puppet wasn't ready," says Nick Dudman, a makeup effects artist working on Stuart Freeborn's team. "We were still gluing bits on and pulling things around. Nick's puppet got us out of trouble, and then Stuart's puppet was fed into the mix."

Filming was slow and painstaking, and communication on set was difficult. "It would take three hours of rehearsal to do one line," says Irvin Kershner.

"The pressure was extreme because I was taking too much time, and the reason I was taking too much, was this was the first time this had ever been done," says Oz.

At first, even Lucas wasn't sure Yoda was working. "It was one of the scarier things in the movie. Because if that puppet didn't work, the whole film was going to fail," he says. "Right up until the moment where he was on film, talking, it looked like it was going to be a disaster."

But Yoda came alive in Oz's hand. "It was a very simple puppet performed by a brilliant genius of a man who is an icon in his own way," says Neal Scanlan. "The two of them together gave [us] the greatest hand puppet moment in movie history."

When it was time to start thinking about the Prequel trilogy, Yoda had to be reimagined again. For *The Phantom Menace*, Lucas asked Nick Dudman to create a Yoda that was several decades younger than the one seen in *The Empire Strikes Back*. "George said he wanted a

slightly more aggressive Yoda—Yoda in his prime," explains Dudman. "We didn't change the design. The sculpt was identical. All we did was slightly change the expressions. George saw it, said it was lovely, and that's what he wanted. So that's what we did."

Dudman also upgraded Yoda's inner mechanisms by replacing the cable controls Freeborn had with small motors operated by radio controls.

By the time of *Attack of the Clones*, however, Lucas decided to abandon the puppet Yoda altogether, and ILM created an all-digital version that also appeared in *Revenge of the Sith* and replaced the puppet in *The Phantom Menace* home video release. "The challenge was not only to sell it to George and make him happy, but to make the fans happy," says ILM computer animation supervisor Rob Coleman. "I knew I was treading on holy ground by even attempting to do a CG Yoda, because everybody loved the puppet so much and because Yoda is, arguably, the most important character in the whole *Star Wars* saga."

Coleman and his team studied footage of the puppet Yoda in both *The Empire Strikes Back* and *Return of the Jedi* to replicate exactly how the character moved, how his skin stretched and tightened, and to simulate the puppet's rubbery texture in the CG version.

After seeing the finished CG Yoda, Oz wrote to Coleman and his team expressing his thanks and praise for what they'd achieved.





STAR WARS

E P I S O D E V I

RETURN OF THE JEDI

1 9 8 3

For the third and final film in the original *Star Wars* trilogy, George Lucas wanted even more imaginative and complex aliens than had been seen in both *A New Hope* and *The Empire Strikes Back* combined. So many, in fact, that Lucas felt two creature units were required to build them.

One was run by the returning Stuart Freeborn, whose UK-based crew worked out of EMI Elstree Studios in England, where the first three films were shot. They were tasked with building a new Yoda puppet, a new Chewbacca suit, and between sixty to eighty Ewoks.

The other was ILM's monster shop in San Rafael, California, again headed by Phil Tippett. He was charged with creating the rancor—the fanged monster Luke fights in a subterranean cave.

Both teams were responsible for creating the loathsome Jabba the Hutt and his attendants. Tippett was asked to create the exotic collection of wild and crazy creatures seen in Jabba's palace, and he designed Jabba's look, while Freeborn's studio built a full-scale animatronic version of the crime lord himself.

At the other end of the size scale were the Ewoks, the teddy bear-like inhabitants of the forest moon of Endor. A race of primitive creatures that brought down the mighty Empire with sticks and stones, they were played by children and little people in furry suits. These bundles of mischief and fun are among the saga's most endearing and heartwarming creations.

"Ewoks Carrying C-3PO on Endor," production illustration by Ralph McQuarrie



JABBA THE HUTT

APPEARANCES: *Star Wars: Episode VI Return of the Jedi*, *Star Wars: Episode I The Phantom Menace*

MOVIEMAKING MAGIC METHODS: Puppetry, CGI

A large, sluglike creature, Jabba the Hutt is a gangster and leader of the Desilijic cartel on Tatooine. When we first meet Han Solo in *A New Hope*, he owes Jabba a sizeable debt.

George Lucas had planned to show the grotesque Jabba in the original cut of *A New Hope*, and he shot a sequence with Jabba and Solo in the *Falcon's* hangar on Tatooine. Originally, Jabba was played by an actor Lucas hoped to replace with a creature in postproduction. But when the production ran out of money, the scene was dropped. And so Jabba remained a menacing, if invisible, presence until his belated debut in 1983's *Return of the Jedi*.

When it came to designing Jabba for his long-awaited starring role, Lucas turned to his U.S.-based team of artists, designers, and effects technicians headed by Phil Tippett.

"Jabba the Hutt was a design free-for-all," recalls Tippett. "George just said, 'See what you can come up with.'"

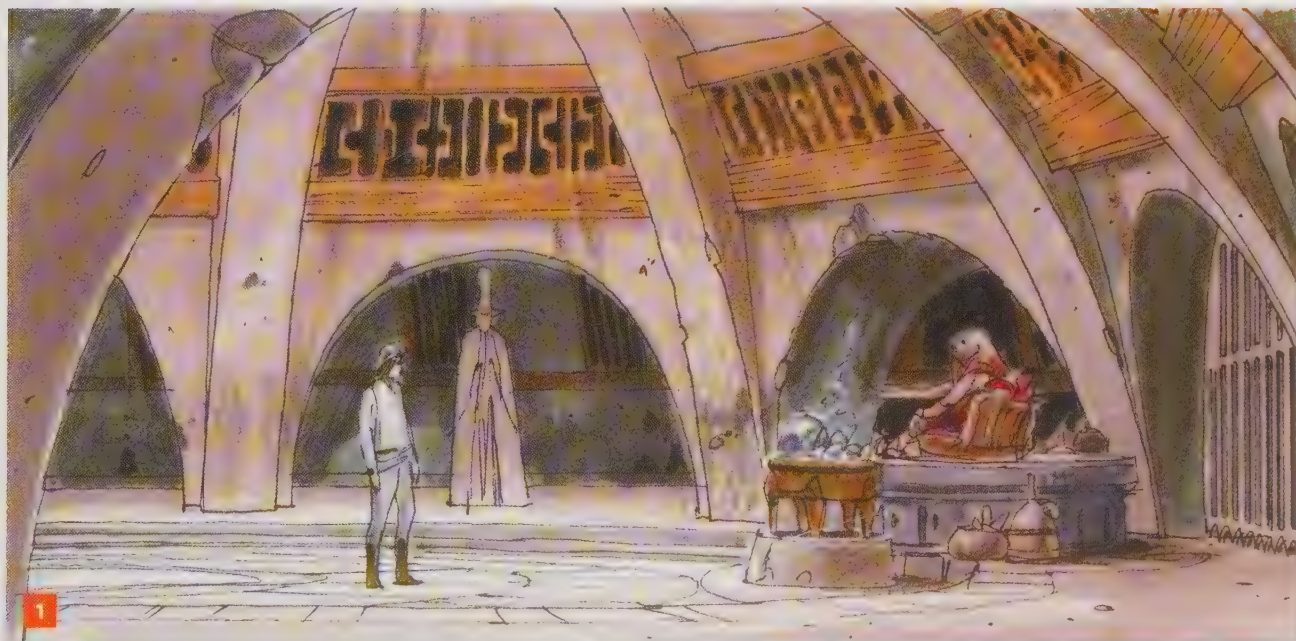
The U.S. creature crew's early concepts—drawings and clay models—included a "sluggish, wormy creature" with tentacles. Lucas wasn't impressed. "George took a look and said, 'No. Too terrible,'" remembers Tippett. "We went to another version, a much more humanoid thing with four arms. And he said, 'No. Too human. Try again.'"

"In my sketches Jabba was huge, agile, sort of an ape-like figure," says Ralph McQuarrie. "But then the design went in another direction."

Lucas wanted a drooling, belching, toothless creature with a large, gross tongue, distorted features, green-yellow eyes, a saclike stomach that wiggled and sloshed, a pulsating neck, and a runny nose. After seventy-six different concepts, Lucas went with Tippett's sluglike maquette. "George said, 'That's it. That's Jabba right there,'" recalls Tippett, whose design was inspired by annelid worms—hairless creatures without skeletons. He had modeled Jabba's head, with its bulbous eyes and a wide mouth, on a snake.

With Jabba's design confirmed, Stuart Freeborn and his team began the task of building the eighteen-foot-long creature. Lucas insisted Jabba be as realistic as possible, with full use of his eyes, mouth, forehead, and body. He wanted Jabba to be able to belly flop, swat his tail, drink liquids, and eat food, as well as "wobble, wrinkle, and have convincing use of his arms and hands to hit people and grab things."

1 "Jabba's Throne Room," production illustration by Ralph McQuarrie



STAR WARS:

"JABBA THE HUTT"
Concept sketches

Ralph McQuarrie

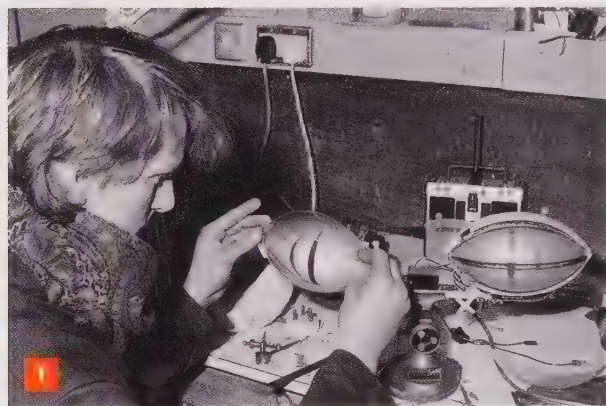


Assisted by a crew of six, Freeborn worked eighty-hour weeks (more than eleven hours per day) to finish Jabba in time. "Jabba was enormous, one of the most difficult ones," says Freeborn, who rarely left his workshop at Elstree. "I had carpenters construct a frame and then modeled the clay over the wooden structure." Jabba was so large, in fact, that two of Freeborn's crew mocked up a quick, full-size model of Jabba to make sure it would fit into the sets that he was building.

John Coppinger was the lead sculptor on the full-scale clay sculpt. It took four tons—about eight thousand pounds!—of clay to build Jabba. The final structure was so big it had to be dried in sections before it could be used to produce plaster and fiberglass molds.

Once the molds were finished, Freeborn's team poured in six hundred pounds of latex to create Jabba's foam skin. Jabba's body and head were made of separate hollow fiberglass pieces over which the foam latex rubber was laid. Inside Jabba's body, cables and animatronic mechanisms connected to the tail. The belly was "bungeed" to make it springy. This, coupled with a series of massive bladders—half-filled air sacs—gave the stomach its flubby quality.

Jabba's facial movements were controlled by a series of paddles and valves inside his head. Together with smaller air sacs, these mechanisms allowed Jabba's skin to bulge, his cheeks to ripple, and his eyebrows to arch, allowing him to react and show emotion.

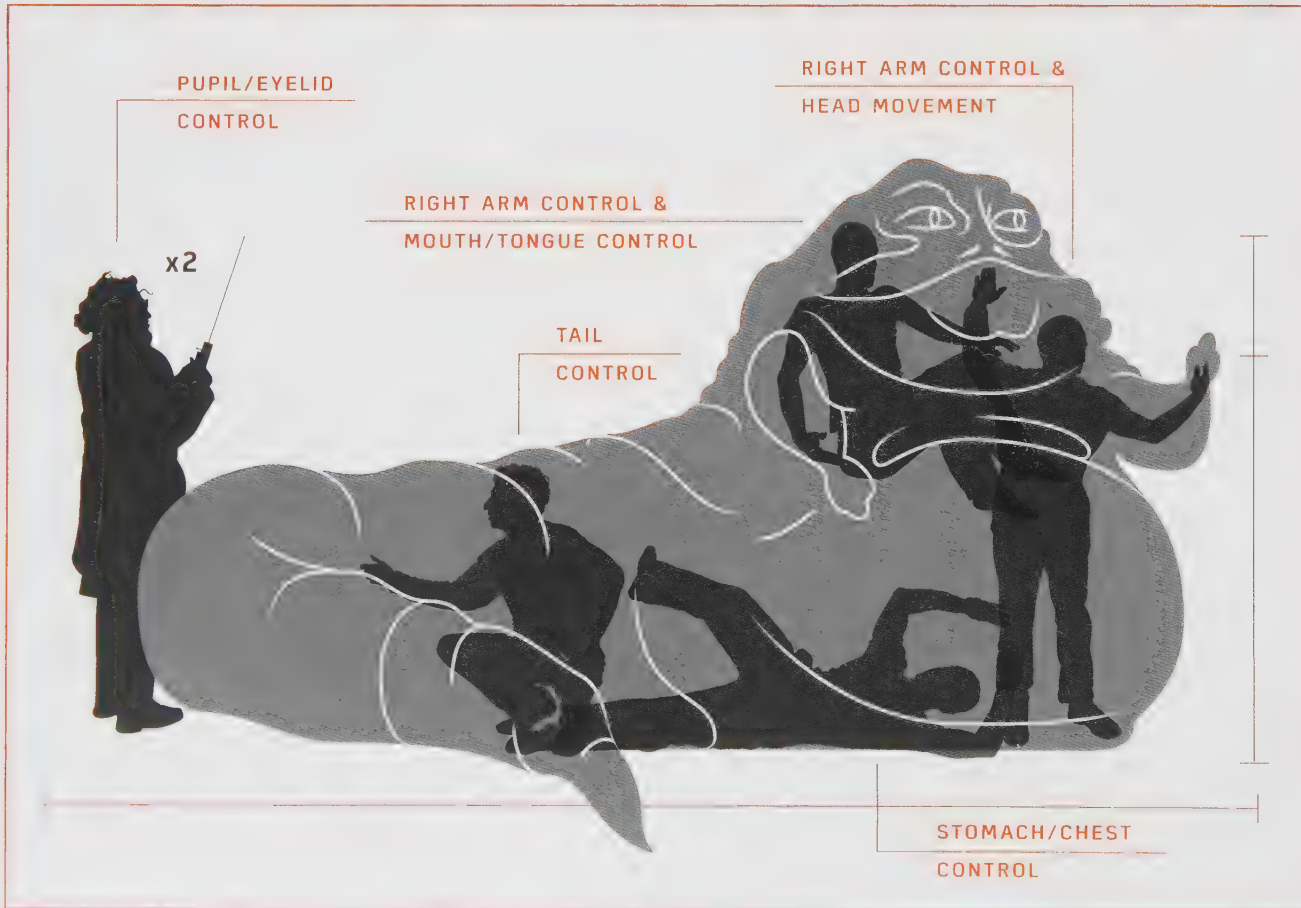


Lucas thought Jabba's eyes were key to bringing the character to life. Not only did he want Jabba's eyes to move, he wanted the irises to dilate as they reacted to light. On set, two puppeteers operated Jabba's eyes by radio control.

The final puppet weighed about two thousand pounds and cost a reported \$500,000 to build, which would be more than \$1 million today. It was finished the weekend before shooting.

Operating Jabba required a minimum of two puppeteers to be inside. Toby Philpott and David Barclay were positioned shoulder to shoulder. Philpott's left arm operated Jabba's left arm and Barclay's right arm operated Jabba's right. Additionally, Philpott's right hand controlled Jabba's head, moving it up and down as well as left to right. Philpott also had cable controls to manipulate

- 1 *Developing Jabba's eyes in the makeup and creature department.*
- 2 *Eyes now in place, work can begin on the animatronics in Jabba's head.*
- 3 *Full-size Jabba body and head.*
- 4 *Special gloop made by the makeup crew was applied to Jabba's mouth and nostrils between takes.*





Jabba's mouth and tongue, to make Jabba snarl and lick his lips. Together, Philpott and Barclay would rock Jabba with their feet to shift his body and make him thrash about on cue. Barclay also spoke Jabba's lines, in English. (Jabba's lines were replaced in postproduction with Huttese, a language created by sound supervisor Ben Burtt.)

For wide shots, Mike Edmonds, who would later play an Ewok, was positioned inside Jabba's tail, moving it by hand with a lever to convey the character's emotional state.

Philpott, Barclay, and Edmonds had all worked for Jim Henson's Creature Shop on *The Dark Crystal* (1982) and were used to the physical demands of puppeteering. All three had their own headset and television monitor that gave them a partial view of Jabba's exterior. "We had to work semi-blind," says Philpott. The two puppeteers in charge of Jabba's radio-controlled pupils and eyelids stood near *Return of the Jedi* director Richard Marquand and helped relay the director's comments to Philpott, Barclay, and Edmonds via microphone. Conditions inside were hot and uncomfortable—at best.

Additional puppeteers were hidden beneath Jabba to work his nostrils; Richard Padbury blew smoke through a tube so it trickled out the corner of Jabba's mouth when he smoked; Mike Osborn operated a series of bellows to simulate Jabba's breathing.

Between takes, a special gloop made by Freeborn's makeup crew was squirted up Jabba's nostrils and applied onto his mouth, so Jabba was always glistening and slaverling.

Prior to filming, director Richard Marquand would run through what he expected from Jabba's performance with Philpott and the other puppeteers. "We had to discuss—and rediscuss—what the eyes should do; where they would go; the range of different emotions [Jabba] would have to express during the sequences. I would say, 'Now he's looking at me . . . now he's looking sly . . . now looking interested . . . now looking angry.'"

The puppeteers asked that Marquand speak as if Jabba were an actor. "We said, 'Please don't talk about him in parts, like, can someone wiggle the tail?' We got him to address us as Jabba. 'Jabba, I want you to look angry at this point!'" Philpott recalls. "We were the main character in the scenes, so there was quite intense pressure to get it right."

"It says a lot about everybody's patience that it worked," says Marquand. "Jabba is so totally lifelike."

For the Special Edition, a new and improved CG Jabba was included. A CG Jabba also appeared in *The Phantom Menace* at the start of the podrace, alongside a female Hutt called Gardulla.

JABBA'S PALACE CREATURES

APPEARANCE: *Star Wars: Episode VI Return of the Jedi*

MOVIEMAKING MAGIC METHODS: Prosthetic makeup, Puppetry, Animatronic heads, Costumes



To play the various creatures in Jabba's entourage, Phil Tippett cast dancers, circus performers, puppeteers, and street mimes as well as actors. Some performers who played background creatures wore simple slip-on latex masks. Other creatures were complex puppets. Cable-assisted masks—offering a fuller range of facial expressions—were used for close-up work, with eyes that turned and blinked and brows that moved.

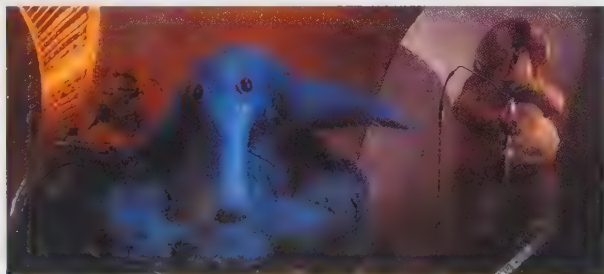
The set for Jabba's Palace was built several feet off the ground to allow the puppeteers access below. With so many cast and crew crammed into one space, temperatures often reached one hundred degrees under the studio lights, making conditions unbearable for performers wearing foam latex or inside monster suits. Between takes, hair dryers set to cool were used inside the masks and costumes to help cool them.

Keeping Jabba's court jumping was a trio of alien musicians that became one of Lucas's pet projects. The

Max Rebo Band was led by the blue-skinned elephantine Max, a puppet operated by one performer inside and another handling cable controls that moved his floppy ears and trademarked snout. Actor Deep Roy, who had played Yoda for several walking shots in *The Empire Strikes Back*, was reed player **Droopy McCool** in a foam mask and full-body costume.

On vocals was **Sy Snootles**, whose most striking feature—her large, red lips and snout—was Lucas's idea. "I went to see the first mock-up and she had these little, teeny lips," he recalls. "It occurred to me, 'Wouldn't it be great if at the end of this long snout were these giant red lips?'"

Designed by Tippett, Snootles was, for full-length shots, a cable-and-rod marionette. Wires were attached to her hands, head, and back from above, while a puppeteer below the set used rods to make her legs move. For close-ups, Snootles was a hand puppet. For the Special Edition, a CG version replaced the original puppet.





Jabba's sidekick, the cackling **Salacious B. Crumb**, was a basic rod-and-hand puppet.

For some scenes, the pig-like **Gamorrean Guards** wore simple pull-on masks. For close-ups, the masks were more articulated—cable controls allowed the mouths to open, the eyebrows to move, and the noses to breathe and snarl.



- 1 *Tippett demonstrating how Sy Snoodles marionette would be operated*
- 2 *Tony McVey with an early version of the puppet he created for Salacious B. Crumb.*
- 3 *Actor testing out an early version of a Gamorrean Guard suit*



Bib Fortuna was played by actor Michael Carter in prosthetic makeup that took up to eight hours each day to apply. Air bladders in the brows and temples, operated through hoses by off-stage technicians, created a pulsing effect as Carter spoke and moved. Dayglow-orange contact lenses gave the character a piercing stare.



Oola, Jabba's green-skinned Twi'lek dancer who is dropped into the rancor pit, was played by actress Femi Taylor wearing green body makeup and two foam tentacles attached to her head that responded to her every gesture and movement.

Several creatures from the cantina were dusted off and reused to flesh out the crowd in both Jabba's Palace and barge. They included two Rodians, a Saurin, a Snivvian, an Aqualish, a Duros, a H'nemthe, and a Nimbanel, as well as an Ugnaught from *The Empire Strikes Back* renamed Yoxgit.

- 1 Adding hair to a mask of Saelt-Marae, aka Yak Face
- 2 Early concept illustrations of Bib Fortuna and Oola by Nilo Rodis-Jamero
- 3 Lucas with key production personnel in the ILM monster shop
- 4 Phil Tippett and Stuart Freeborn with Jabba's Palace creatures





RANCOR

APPEARANCE: *Star Wars: Episode VI Return of the Jedi*
MOVIEMAKING MAGIC METHODS: Puppetry, Animatronics

During Luke Skywalker's attempted rescue of Han Solo from Jabba the Hutt's castle in *Return of the Jedi*, Luke tumbles through a trapdoor and into the home of the towering rancor—a hideous clawed monster, with a slobbering mouth and ferocious fangs.

The rancor, one of the most recognizable creatures in the *Star Wars* series, was designed by Phil Tippet. "George [Lucas's] original instructions for the rancor were, 'Do whatever you want, but I want a big monster in a pit,'" Tippet says.

After Lucas rejected his first few designs, Tippet gave ILM's art director Joe Johnston (who would go on to direct 2011's *Captain America: The First Avenger*) a crack at designing the rancor. But, again, Lucas said no. "Finally, Joe came up with a design based around a man in a suit," Tippet explains. "I took that and refined it into something a human could never fit into: long, spidery arms, little ape-like legs, and a head that wouldn't allow a human head to go inside. Naturally, George loved it."



Tippet begged Lucas to try something else, believing the person-in-a-suit approach wasn't the best way to go. He wanted to use either stop-motion animation or go-motion, which he had developed for the tauntauns and AT-ATs in *The Empire Strikes Back*.

But Lucas insisted they try the suit idea, feeling that both stop- and go-motion animation had the potential to look fake on-screen. In addition, they were more costly and incredibly more time-consuming than a person-in-a-suit monster.

- ◀ *Rancor concept sketches by Ralph McQuarrie and Joe Johnston.*
- 1 *Working on the prototype rancor costume in the monster shop*



"There was quite an effort to keep the costs down on [creating the rancor]," recalls visual effects supervisor Dennis Muren. (Muren, along with Tippett, visual effects artist Ken Ralston, and special effects cinematographer Richard Edlund, would win the Best Visual Effects Oscar for their work on *Return of the Jedi*). "We were looking for a way to do the creatures that was cheaper; we thought about rod puppets. But George wanted to try this guy in a suit—if we could make the suit interesting enough." In fact, Lucas wanted "the most elaborate man-in-a-suit monster ever," says Muren.

With that in mind, he and Tippett began brainstorming ideas. "What we came up with was this big, lizard-like creature that took three people to operate, with elaborate arm extensions and a complex face-moving mechanism," remembers Tippett. "Like a really cool Godzilla."

When the rancor suit was almost finished, ILM shot two videos of the creature to get an idea of how everything was going to look. "The suit was pretty limited, but it was starting to work," notes Muren.

But when Lucas saw the footage, he didn't think the suit worked at all, and he told Tippett to go ahead and try it any other way he wanted.

Unfortunately, Tippett's crew had spent so long developing the unsuccessful person-in-a-suit idea that there

wasn't enough time left in the schedule to film the rancor using go-motion. Instead, Tippett opted for a less cutting-edge, more traditional approach. "We went back to Phil's original design—which couldn't be a man in a suit—and came up with the idea of trying something like a Japanese Bunraku-style rod puppet," explains Muren. "A hand puppet [with] rods coming out of the arms and legs so they could be operated externally."

Together with fellow animator Tom St. Amand, Tippett built an eighteen-inch rod puppet using a stop-motion armature as the skeleton and covering it with foam rubber. To bring it to life, Tippett wore the puppet like a glove, animating its head and mouth with his hand. St. Amand worked the arms using black rods that extended from the puppet's elbows while Dave Sosalla operated the rancor's feet. Visual effects artist Eben Stromquist created a set of hinged mechanical hands, controlled by pulling wires, that allowed the rancor's claws to close just like human fingers.





The puppet was filmed in a thirty-inch cave set that was an exact replica of the full-size set on which Mark Hamill acted opposite a cardboard rancor. Hamill was filmed against a blue screen, which enabled ILM to add him seamlessly into their rancor footage for a number of shots. Tony McVey created a large-scale rancor hand for close-ups of the creature picking Luke up.

Muren filmed the rancor with wide lenses and from a lower angle to make it appear bigger—turning an eighteen-inch puppet into a ferocious sixteen-foot monster. In addition, Muren shot the rancor at a fast film speed to give it the illusion of having real size and weight.

The puppet footage was eventually edited together with the live-action footage of Mark Hamill. The result of all their hard work, skill, creativity, and ingenuity is a movie monster that, thirty years later, stands the test of time. Described by Tippet as a “cross between a bear and a potato,” the rancor remains not only one of the *Star Wars* saga’s greatest-ever creatures, but one of cinema’s most memorable monsters. Huge, powerful, and, above all, believable.



- 1 *Phil Tippet working on the rancor puppet.*
- 2 *Muren and Tippet shake claws with the puppet.*
- 3 *Tippet holding up the puppet as it's prepared for filming.*
- 4 *Filming at wide and low angles to make the monster appear larger.*
- 5 *Close-up of puppet.*

SARLACC

APPEARANCE: *Star Wars: Episode VI Return of the Jedi*

MOVIEMAKING MAGIC METHOD: Puppetry



The carnivorous Sarlacc, a repulsive, mucous-lined hole surrounded by thousands of needle-sharp teeth, is found in the Great Pit of Carkoon in Tatooine's Dune Sea. It's where Jabba the Hutt planned to dispose of Luke and Han, promising them "a new definition of pain and suffering" as they are slowly digested over thousands of years.

Originally called the Sloth Pit, the Sarlacc's design developed over time, beginning with Ralph McQuarrie's early concept drawings of a creature with moving tentacles and a pronounced beak. Eventually, due to technological and financial issues, it became a gaping mouth with jagged teeth and tentacles.

Built in the desert in Buttercup Valley, California, the Sarlacc Pit featured a three-meter-wide mouth that was the only part of the enormous Sarlacc visible above ground; the rest was concealed beneath the sand. Six men were hidden underneath the set and armed with ten-foot poles and wires to make the mouth pulsate and the tentacles move.

The creature's teeth were twelve to fourteen inches long, carved from foam rubber and brushed with latex to create a durable skin. The teeth were soft to ensure the safety of the stuntmen who had to dive into the pit during filming. Even so, one broke his ankle.

For the tentacle that grabs Lando by the leg and tries to pull him in, mechanical effects supervisor, Kit West, built an elaborate piece of equipment with wires and radio control. But when West brought it to the set, George



Lucas took one look at the complicated mechanism and said, "No." He suggested they wrap the tentacle around the leg of Billy Dee Williams (the actor who played Lando) and film the tentacle being pulled away. When played in reverse—as the scene appears in the final cut of the film—it looks like the tentacle is grabbing Lando's leg, rather than releasing it.

Lucas had ILM enhance the creature for the Special Edition, adding a beaklike tongue and extra tentacles, because he didn't feel the Sarlacc was sufficiently "alive."

1 *Concept sketches by Ralph McQuarrie*

2 *Building the three-meter wide mouth*

FORCE FACT

Every morning before filming began, the production sent a crew into the Sarlacc Pit to clear out rattlesnakes that congregated inside to escape the desert heat.



ADMIRAL ACKBAR

APPEARANCES: *Star Wars: Episode VI Return of the Jedi*,
Star Wars: Episode VII The Force Awakens, *Star Wars: Episode VIII The Last Jedi*
MOVIEMAKING MAGIC METHODS: Puppet, Costume

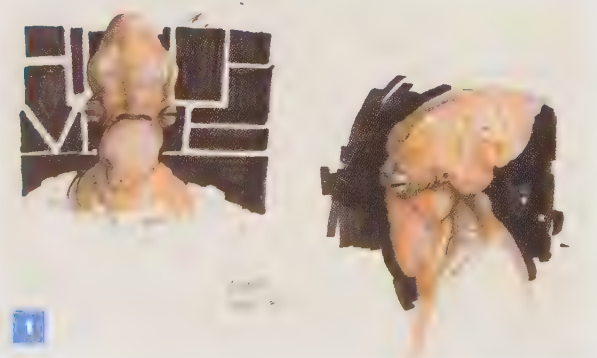


Admiral Ackbar started out as an anonymous alien in a concept sketch by concept artist Nilo Rodis-Jamero. But *Return of the Jedi* director Richard Marquand took a shine to him and promoted the background character to rebel fleet commander with a speaking part.

In wide shots, Ackbar, a Mon Calamari, was played by actor Tim Rose in full costume created by Phil Tippett with a head that featured a basic cable-controlled mouth and limited eye movement. A more complex head and shoulder puppet was created for close-ups, with Rose operating the head and mouth, while a performer standing behind him operated the hands. Several off-camera puppeteers worked Ackbar's eyes, lips, nose, and eyelids using cable controls, giving the character more life than was possible at the time with an animatronic mask. Other Mon Cals were painted in a range of colors and tones, some lighter, some darker than Ackbar's salmon tone.

When it came to Ackbar's reappearance in *The Force Awakens*, creature supervisor Neal Scanlan says they respected the methods Tippett had used to create him. But without access to the original molds, Scanlan's crew had to replicate Ackbar as best they could from photos and footage. "We added a few things that made it feel a bit more contemporary," he says. "It's a very subtle blend of what we can do today, and what they did in the past."

1 Initial concept art by Nilo Rodis-Jamero



NIEN NUNB

APPEARANCES: *Star Wars: Episode VI Return of the Jedi*,
Star Wars: Episode VII The Force Awakens, *Star Wars: Episode VIII The Last Jedi*
MOVIEMAKING MAGIC METHODS: Puppet, Costume, Animatronic mask



Among the many memorable monsters introduced in *Return of the Jedi* was the jowly, mouse-eyed Sullustan known as Nien Nunb, who got to copilot the *Millennium Falcon* alongside Lando Calrissian in the climactic attack on the Death Star.

Initially played by an actor in a simple, static mask for his appearance in the briefing scene, Nien Nunb had his part expanded when the character was given lines



and added responsibility. The mask was revamped and a hand puppet-style body added. Mike Quinn operated both the reworked head and mouth while another performer's arms stood in for Nien Nunb's on the *Falcon* cockpit set.

For *The Force Awakens*, Nien Nunb was an animatronic mask, again worn and performed by Quinn.

1 Puppeteer operating a Sullustan on set





EWOKS

APPEARANCE *Star Wars: Episode VI Return of the Jedi*

MOVIEMAKING MAGIC METHOD *Costumes*



Short in stature but big of heart, the Ewoks are a treetop-dwelling race from the forest moon of Endor who bring down the technological might of the Empire using just sticks and stones.

Originally, George Lucas intended the Ewoks to be Wookiees. But when Chewbacca became Han Solo's co-pilot, Lucas needed a new species. "I decided to keep the characters fuzzy and hairy, but, instead of long hair, I gave them short hair," he explains.

The Ewoks were given to Ralph McQuarrie to design before Joe Johnston, Phil Tippett, and Nilo Rodis-Jamero took over. Together they produced hundreds of sketches. At first, the sketches were too troll-like for Lucas's liking. He wanted the Ewoks to be much cuter. "I did one so cute it looked like the teddy bear's picnic," recalls Johnston. "It had little ears and was wearing a little bonnet. George came in the next day and said, 'That's it. We'll kill 'em with cuteness!'"

Once the design had been settled on, Lucas turned to Stuart Freeborn to bring the Ewoks to life. Freeborn began by plaster casting the heads, hands, and feet of a number of little people. From the body castings, his crew fabricated a series of foam-rubber suits with acrylic fur over the top. Using the head casts, Freeborn's team sculpted



Ewok faces, which were molded and cast in foam latex. These featured plastic eyes and teeth made from dental acrylic for a lifelike look, and some even had mechanisms to make the jaws move.

But Freeborn quickly discovered the suits did not work the way he'd hoped—they proved too cumbersome to move in. Freeborn designed a new suit that was softer, thinner, and more flexible.

1 *Makeup artist helping an Ewok into costume during a test shoot*

STAR WARS:

"EWOK"

Concept sketches

Ralph McQuarrie

& Joe Johnston





In the end, Freeborn's crew built between sixty to eighty different Ewoks for the scenes on Endor, which were shot both in England and on location in the giant Redwood forest near Crescent City, California.

Among the actors who auditioned for Ewok roles was eleven-year-old Warwick Davis.

A massive *Star Wars* fan, Davis leaped at the chance to be part of the series. "I don't think anybody on the movie was quite as excited as I was," he says.

At two feet eleven inches, Davis was the shortest actor cast, and he was initially going to play a supporting part. But Davis was promoted to the leading role of Wicket W. Warrick, perhaps the best-known Ewok in the saga when the actor slated to play him fell ill with food poisoning. "Technologically we were limited in what we could do to create these kinds of creatures and make them real," recalls Lucas. "Mostly it depends on the personality of the actor inside the suit, and I was fortunate to find this little boy who was so expressive and had such personality in the way he walked, and the way he carried himself, and the way he was able to act. He really was one hundred percent into the character."



1 Kay Freeborn takes inventory of Ewok heads.

2 Warwick Davis being outfitted in Ewok costume.



Expressive body language was hugely important for the actors playing Ewoks, so Davis and company studied the way animals moved.

"I had a dog at the time, and I remember whenever he would hear a strange noise he would tilt his head from side to side to look inquisitive," reveals Davis. "I took those movements and used them in the character."

To create languages for *Star Wars* characters, sound designer Ben Burtt listened to languages around the world for interesting sounds. When it came to the Ewoks, Burtt remembered a television documentary on nomadic

tribesmen from central China and thought their language, Kalmyk, would be perfect. He tracked down an elderly woman in the United States who spoke the language and recorded her telling stories. "She gave us some wonderful sounds that were the inspiration and basis for a lot of the Ewok voices," he says.

1 Ewoks with clapperboard on the set of "Blue Harvest," a code name for *Return of the Jedi*

2 Early reference photo of actors with Ewok heads off



STAR WARS TRILOGY

SPECIAL EDITION



In 1997, to celebrate the twentieth anniversary of *Star Wars*, George Lucas took the opportunity to digitally restore, remaster, and rerelease *Star Wars* (which had since been retitled and would now be known as *Star Wars: Episode IV. A New Hope*), *The Empire Strikes Back*, and *Return of the Jedi* in both cinemas and for home video. The new versions were together called *Star Wars Trilogy Special Editions*.

Lucas also used the opportunity to make various changes and additions to all three, replacing rubber monsters with computer-generated creatures, adding squadrons of shiny starships to several space battles, and digitally enhancing explosions to make them more dynamic. The idea was to bring the original movies closer to what Lucas had in mind when making them. "There were a lot of things in the original films I found frustrating," he says, "because, to me, the illusion was too thin."

For *A New Hope*, Lucas reinstated a scene between Jabba the Hutt and Han Solo that had originally been shot with Harrison Ford and an actor named Deslan Mulholland standing in for Jabba. But Lucas had ILM replace Mulholland with a computer-generated Jabba.

He also had ILM add computer-generated dewbacks into the scene in which stormtroopers search the desert wastelands of Tatooine for C-3PO and R2-D2. ILM also

added several new shots with background dewbacks. A CG dewback was also added to the film's new, expanded introduction to Mos Eisley spaceport while two Jawas were shown being bucked from the back of an all-new CG ronto in another Mos Eisley scene. (The ronto, created for the special edition, was modeled after elephants, rhinos, and dinosaurs.)





In *The Empire Strikes Back*, Lucas had ILM add several new wampa scenes. One featured a scarier-looking, full-size creature eating the body of a dead tauntaun. Another showed the creature howling in agony after Luke slices off one of his arms with his trusty lightsaber.

In *Return of the Jedi*, Lucas replaced the puppet Sy Snootles, lead singer of the Max Rebo Band seen in Jabba's Palace, with a CG version. He felt the original puppet didn't move the way he had wanted and was unable to lip sync correctly when singing. He also felt her eyes didn't move properly.





The CG Snooties allowed Lucas to incorporate both a bigger musical sequence and new song into the scene. He also increased the size of Max's band from three to twelve members.

In addition, ILM revised the Sarlacc Pit monster to feature a more beak-like mouth and extra tentacles, which matched Ralph McQuarrie's original designs. And they also added extra Ewoks to the climactic celebration on Endor.

Lucas made a number of additional amendments to all three films in 2004 when they were released on DVD.

These included a new and improved CG Jabba that more closely resembled the one that had appeared in *The Phantom Menace*, an added eye blink to the trash compactor monster when it appears above the water on the Death Star, and the Ewoks blinked, too.

He later inserted a CG Dug, initially created for the Prequel trilogy's first film, *The Phantom Menace*, to the scene in Jabba's Palace when the saga was released on Blu-ray in 2011.



STAR WARS

E P I S O D E I

THE PHANTOM MENACE

1 9 9 9

When George Lucas announced plans in the mid-1990s to make another three *Star Wars* films, known as the Prequel trilogy, fans were delighted.

Special effects had advanced since Lucas made the original trilogy. But it was only when ILM created the computer-generated dinosaurs for Steven Spielberg's groundbreaking *Jurassic Park* (1993) that Lucas knew technology had reached a place where he could imagine returning to his galaxy far, far away.

To design the new film, Lucas turned to Doug Chiang, who was then working at ILM as a visual effects art director. (Ralph McQuarrie, who was then in his 70s, had passed on Lucas's offer to return.)

The Prequels told the story of Anakin Skywalker's transformation from a young slave living on Tatooine into Darth Vader, and Chiang began designing all three movies at once.

The Phantom Menace would prove revolutionary in its use of computer-generated imagery, with ILM responsible for the creation of Jar Jar Binks, the saga's first fully walking, talking, all-computer-generated character.

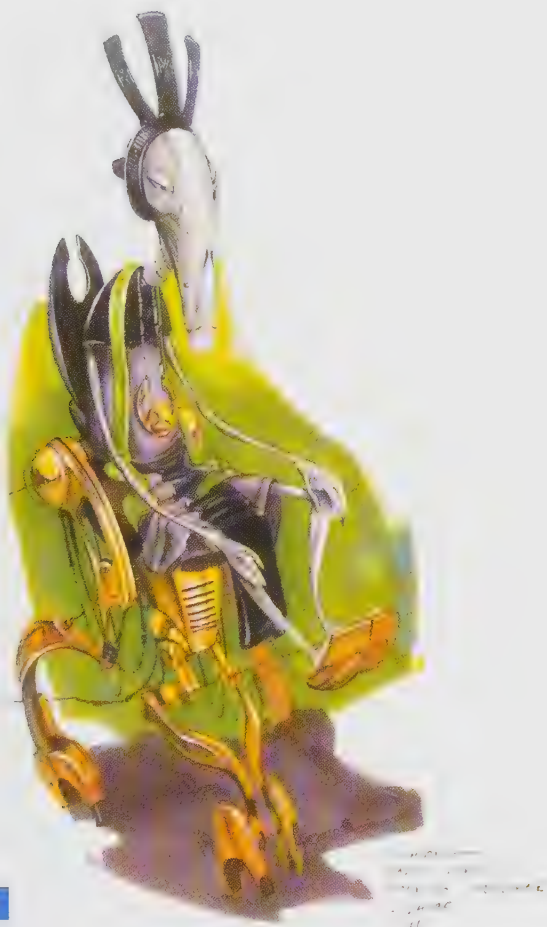
In addition to Jar Jar, Rob Coleman's animation team created several other CG characters for *The Phantom Menace*—Boss Nass and Sebulba among them—as well as countless CG aliens for the scenes on Naboo and Tatooine.

For certain creatures and situations, practical creature effects—puppets, animatronics, prosthetic makeup—were still the best option, and Nick Dudman, who'd worked on *The Empire Strikes Back* and *Return of the Jedi*, replaced Stuart Freeborn as live-action creature design effects supervisor.

Gungans concept illustration by Doug Chiang

NEIMOIDIANS

APPEARANCES: *Star Wars: Episode I The Phantom Menace*,
Star Wars: Episode II Attack of the Clones, *Star Wars: Episode III Revenge of the Sith*
 MOVIEMAKING MAGIC METHOD: Animatronic masks



1

Neimoidians, the first creatures seen in *The Phantom Menace*, were originally designed by Doug Chiang. They were meant to have elongated faces that mimicked battle droids.

They were also meant to be all-CG characters. However, just five weeks before they were due to be filmed, George Lucas changed his mind and decided they should be practical creatures, "because we were pushing the boundaries of technology and already had several key digital characters," says Chiang.

Live-action creature effects supervisor Nick Dudman suddenly found himself with an additional species to create. He printed out photos of all the characters from the cantina in *Star Wars* and asked Lucas which race they were closest to. "George pointed at these two red-eyed, green-skinned creatures [the Duros] and said, 'It's them.' So we knew roughly what he wanted." Dudman made



the designs more human-like so the Neimoidians could be performed by actors in animatronic masks. He repurposed the articulated heads from the mangalores, a race of creatures created for *The Fifth Element* in 1997.

Then Dudman had his key sculptor, Gary Pollard, work up a series of clay masks over fiberglass skulls. "Gary has an amazing ability to create an entire race of characters out of the most simple forms. He was able to sculpt Neimoidians that not only looked interesting, but also looked different from one another. George came around and said, 'That's Nute Gunray, that's Rune Haako.' We said, 'Okay' and carried on."

The jaws were the only element of the masks that were operated by the actor inside them; all other facial movements were radio controlled.

1 Concept illustration by Doug Chiang

WATTO

APPEARANCES: *Star Wars: Episode I The Phantom Menace*, *Star Wars: Episode II Attack of the Clones*
MOVIEMAKING MAGIC METHOD: CGI

Watto, Anakin's sleazy, pot-bellied master, evolved from a painting of an elephant seal-like creature that Doug Chiang had presented to George Lucas when he was first working on the design for the Neimoidians. "George really liked the portrait," says Chiang, "and, many months later, as he was writing the screenplay, he came to me and said, 'Remember that portrait? I have a new character I want him to be.'"

But while Lucas was taken with the creature's walrus-style trunk and face, he wanted Chiang to put it on a fat body, add bat wings and duck feet, and make the character fly.

"I thought it was going to be a complete failure, but it worked; it was incredible," says Chiang. "I realized George was seeing it in his mind. He knows this world and what he wants for characters. If I had to draw a character [from scratch] I would never have combined those elements because it doesn't make any sense. But it gave Watto personality, and he's one of my favorite characters now for all of those reasons."

Watto proved the hardest character to animate. He was always flying, and realistically, his tiny, hummingbird-style



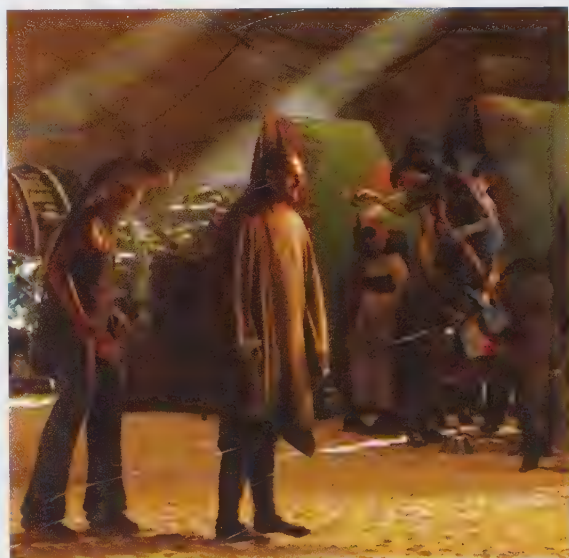
wings shouldn't have been able to support his size. "The physics were all wrong, which made the animation more difficult. There had to be a willing suspension of disbelief. You had to say, 'These wings can lift that body—no problem.' We animated them to beat faster or slower depending on what he was doing. And because he is overweight, there's a bit of labor and bobbing in his flight, as if he's really having to work at staying up."



1 Building the maquette for Watto

FORCE FACT

The same simulation software program developed by ILM to create the cord for Watto's tool belt was also used to make Jar Jar Binks's ears flap.





DARTH MAUL

APPEARANCE: *Star Wars: Episode I The Phantom Menace*

MOVIEMAKING MAGIC METHOD: *Prosthetic makeup*

A terrifying addition to the canon of *Star Wars* villains, Darth Maul was arguably the most iconic new character to emerge from the Prequel trilogy.

"George wanted a new Sith Lord, and we were trying to come up with somebody as intimidating, as powerful, and as iconic as Darth Vader—without using a mask," recalls Doug Chiang.

As played by martial artist Ray Park, Maul was a brilliant piece of concept design by Iain McCaig. Lucas had asked McCaig to create his "worst nightmare," but McCaig's initial design was too much, and Lucas asked him to draw his "second worst."

At the same time, McCaig was working on designs for "evil senators" and experimenting with facial scarring and tattoos.



On one of the designs, McCaig had used tape to create a shapeless pattern. Lucas loved it, and that became the basis for Maul—combined with the markings of a venomous snake. "[T]he idea was that when you looked at him, you were frightened," says Chiang. "Iain created this very graphic pattern. It's very distinct and emotively threatening at the same time."

McCaig's final design featured feathers, but creature supervisor Nick Dudman instead made them horns protruding from Maul's skull. "I thought of them as weapons," he recalls. "And they do look like sharks' teeth."

- 1 *Concept art by Iain McCaig.*
- 2 *Applying makeup was an hours-long process.*

FORCE FACT

One of McCaig's early designs for Darth Maul inspired Mother Talzin in the animated series, *Star Wars: The Clone Wars*.

SEBULBA

APPEARANCE: *Star Wars: Episode I The Phantom Menace*
 MOVIE MAKING MAGIC METHOD: CGI



When it came to designing Anakin's podracing nemesis Sebulba, a dug, George Lucas pictured the pilot as a "spidery character" who walked on his hands and drove with his feet.

"George wanted something very unusual," explains Doug Chiang. "He was looking for a villain. We also wanted to keep the character small, so when you first see him you're not threatened. Until he jumps up and knocks Anakin over, and you realize, Oh man, he is the boss villain of this environment."

Concept artist Terry Whitlatch "did a brilliant job" designing him, says Chiang. "She started to explore how you



can get a mammalian creature to be spiderlike in terms of personality and movement."

Sebulba's face was made to look like a camel with "bad attitude," and his color scheme was inspired by an Easter egg.

Once the final design was approved, the character was animated to move like a cross between an orangutan and a sloth.

The sharp tusks present in the majority of Whitlatch's and Iain McCaig's early concept drawings were dropped to make the character easier to animate.

1 *Concept sketches by Terry Whitlatch*

2 *Videomatic model of Sebulba used to shoot placeholder videos during animatics*



BOSS NASS

APPEARANCES: *Star Wars: Episode I The Phantom Menace*, *Star Wars: Episode III Revenge of the Sith*
MOVIEMAKING MAGIC METHOD: CGI

After designing Jar Jar Binks, Doug Chiang's design team turned its attention to Boss Nass, the pompous leader of the Gungans. "We thought, Let's take Jar Jar's physiology and expand on it. What if Jar Jar ate a lot? What would he look like?" says Chiang. "It was really fun to explore the different variants of what Gungans could be—and Boss Nass evolved out of that. George wanted to play up the whole amphibian/frog aspects."

It wasn't until Lucas cast British actor Brian Blessed in the role that the character's final look came together. "When [Brian] read for the part, he did this wonderful thing with his lips, and George said, 'I love what he did. Let's try and build that into the design. Let's give him really fat cheeks and really loose lips.' So we took the base design of the Gungans and evolved it to fit the personality of the actor performing it."

When it came to creating Nass in CGI, animation director Rob Coleman's team relied as much on Blessed's huge personality as Chiang had. "Brian brought so much character we hardly needed other references," explains Coleman.



FORCE FACT

Jar Jar was originally meant to be green. But when he became orange, Boss Nass and the other Gungans were painted that color.





JAR JAR BINKS

APPEARANCES: *Star Wars: Episode I The Phantom Menace*,
Star Wars: Episode II Attack of the Clones, *Star Wars: Episode III Revenge of the Sith*
MOVIEMAKING MAGIC METHOD: CGI



1

A bumbling Gungan from the planet Naboo, Jar Jar Binks was the *Star Wars* saga's first overtly comic character and its first fully computer-generated one.

"Jar Jar was a huge challenge," says Doug Chiang. "It was a breakthrough in both character design and execution. George wanted to create somebody that was very memorable, that could be very endearing, that could evolve and change as the story changed. His brief was a comedic character who added humor and levity to the story, but was also very important. He wanted the character to be alien, so definitely not a guy in a costume. He wanted something that could only be executed digitally. So we had the freedom to create without the restriction of having a physical actor."

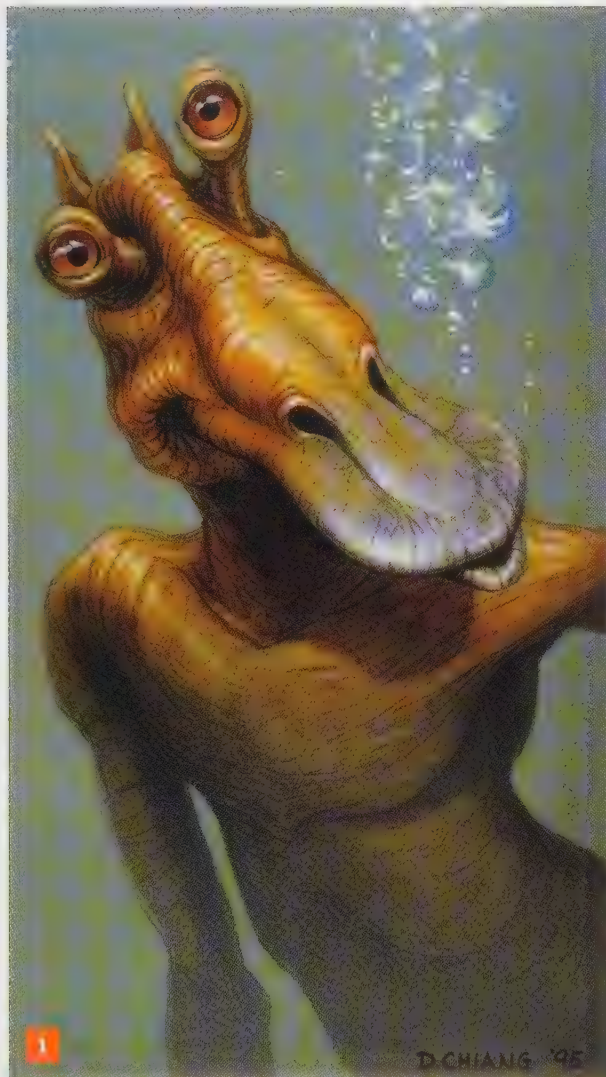
Concept artist Terry Whitlatch's background in zoology and anatomy made her an ideal choice to design Jar Jar. "I have an understanding of how animals live in their environments and interact with each other, so I was able to come up with new species that seemed plausible within

the world of *Star Wars*," she says. "I knew Jar Jar was supposed to be bumbling yet earnest—a misfit—because George had told me more about his personality than what he looked like."

Whitlatch spent months trying out different designs, before Jar Jar evolved into a tall, amphibious creature with eyes on stalks and huge floppy ears. "In some of the earlier concepts he looked a bit like a duck. At another point, we tried to make him look friendly and appealing, but he wound up looking too much like a droopy dog. His body shape and gangly long legs were pretty much in place from the start, but his face and neck went through many changes."

"We knew this character would be performing against humans, so we wanted to keep him relatively human scale," explains Chiang, "but we could play around with

1 **Concept sketches to show facial design by Terry Whitlatch**



proportions. To create a character that moved unusually and could be a little bit comedic, we made his lower leg longer so he would have a peculiar gait.

A year and a half later, Whitlatch had yet to win Lucas's approval. "I'd ask myself, 'Will there ever be a design that George likes?'" she says. "And then, finally, there was."

The turning point came one afternoon when Lucas walked into the art department and saw several sketches Whitlatch had pinned to her bulletin board of a frog-like creature on its hind legs. "They were doodles I had done for my own enjoyment. George liked them. So that worried little frog creature became the proto Jar Jar."

To prevent Jar Jar from looking too much like a frog, however, Whitlatch decided to combine the existing design with that of a duck-billed dinosaur. She made Jar Jar's neck swanlike and gave him three toes on each foot, not only to be "exotic," says Chiang, but because "it's easier to animate three than five."

As Whitlatch, Chiang, and Ian McCaig continued to develop Jar Jar's design, work began on the sculpture. "It's very important to see characters in 3-D as quickly as possible," says Chiang, "because you can design something

that, in one view, looks really good, but then you look at the backside and it completely falls apart."

Whitlatch's line drawings were also blown up and placed on a full-size cardboard cutout so Lucas could see how Jar Jar looked in relation to his human costars.

At this stage, Lucas still wasn't sure whether Jar Jar should be a fully computer-generated character. While he was against Jar Jar being played by a person in a suit, he





was considering putting a CG head onto an actor's body. "The original thought was that it was going to be much too expensive to do every single Jar Jar shot entirely as CGI," says animation supervisor Rob Coleman. "They invested money into building a suit, and we were only going to do head replacements."

Casting director Robin Gurland was on the lookout for a strong, physical performer to play Jar Jar when she saw Ahmed Best in a stage production of the musical *Stomp*. "George wanted a bumbling type, but there wasn't any definitive description of Jar Jar other than he was high energy, comedic, and improvisational," she recalls. "I saw Ahmed moving his arms with a kitchen sink wrapped around his neck, and immediately thought, 'He's Jar Jar.'"

Originally cast solely for his physical prowess, Best ended up voicing Jar Jar as well. "We were looking for someone who could perform unique body movements. But I had him do the dialogue and I liked what he did," says Lucas. "As soon as we started shooting, it became obvious he believed in his lines and in his character."

When Lucas finally committed to a fully digital Jar Jar, "[e]verybody in the art department cheered," says Whitlatch. "We all felt Jar Jar would look much better without the restrictions of a human being in a suit."




But creating a fully computer-generated character wasn't as easy in 1998 as it is now. "Jar Jar was the closest thing to animating a human character we'd ever done," recalls visual effects supervisor Dennis Muren. "There had to be that level of complexity in his performance. And he was acting alongside all of these human characters, played by great actors, so he had to follow the rules of physics and not do anything too fantastic or unreal."

Then there was the sheer amount of animation required, with Jar Jar on screen for almost an hour and a half.

But the end result more than justified the means. "At one point George told me that . . . he'd been very apprehensive about whether or not we were going to be able to pull off Jar Jar," Coleman recalls. "But we had surpassed his wildest expectations."

- 1 Early concept illustration before ears added to design
- 2 Artist painting model
- 3 Full model of head used for digital capture
- 4 Costume head worn by actor on set
- 5 Ahmed Best in costume with Jake Lloyd as Anakin
- 6 Ahmed Best in suit for motion capture



A concept illustration by Erik Tiemens depicting a fiery, orange-hued arena environment. In the foreground, a large, dark, mechanical structure, possibly a part of a creature or a piece of machinery, is visible. The background shows a bright, glowing light source, creating a dramatic, high-contrast scene with long shadows and intense highlights. The overall atmosphere is one of intense heat and action.

STAR WARS

E P I S O D E I I

ATTACK OF THE CLONES

2 0 0 2

With *Attack of the Clones*, the second of the Prequel films, George Lucas continued to push the envelope in terms of digital effects and computer-generated creatures.

In addition to the return of Jar Jar Binks, *Attack of the Clones* featured several new all-digital characters, among them a six-limbed short-order chef, the ethereal Kaminoans, the insect-like Geonosians, and a trio of fearsome creatures fighting in a Geonosian arena.

Perhaps the film's boldest move was introducing a completely computer-generated Yoda. This allowed the two-foot-tall Yoda to move in ways previously impossible for the puppet version. This transformed him into a whirling, twirling dervish, able to wield a lightsaber and duel the treacherous Count Dooku.

"I had a visual concept for the Yoda and Count Dooku fight in my mind for a long time," says Lucas, "but I didn't know how well it would work." A CGI Yoda made it possible. (The puppet Yoda in *The Phantom Menace* would later be replaced with a CGI Yoda when that film was released on Blu-ray.)

Once again, live-action creature supervisor Nick Dudman returned to create a host of practical creatures using traditional prosthetic makeup, masks, and puppets.

He included a new version of the Neimoidians, who had been a last-minute addition to *The Phantom Menace*, having initially been designed to be CGI. With very little time to create them, he had been forced to repurpose an existing animatronic head and sculpt a completely new design on top. For *Attack of the Clones*, however, Dudman had the luxury of redesigning the facial mechanics to provide a greater range of expressions.

Concept illustration of arena creatures by Erik Tiemens

DEXTER JETTSTER

APPEARANCE: *Star Wars: Episode II Attack of the Clones*

MOVIE MAKING MAGIC METHOD: CGI



A six-limbed short-order cook and owner of Dex's Diner, Dexter Jettster was an all-digital creation voiced by Australian actor Ronald Falk.

"George had a really strong image in his mind of who this character was," says Doug Chiang. "He saw him as gruff, wearing an old T-shirt with beer stains and ketchup on it. But he also wanted to have some fun . . . We thought, let's take advantage of him being digital and give him an



extra set of arms! When you start to add things like that, it's being driven by the character—then we build the design to fit that personality type."

In addition to providing the character's voice, Falk stood in as Dex during filming. "We always try to have the voice actor on set," says Lucas. Animation director Rob Coleman was also present. "Unconsciously, an actor will do things with his head and hands, and if we incorporate those things into the computer-generated character, it makes our animation look better," says Coleman.



ZAM WESELL

APPEARANCE: *Star Wars: Episode II Attack of the Clones*

MOVIEMAKING MAGIC METHOD: Actor, CGI



A bounty hunter and assassin hired by Jango Fett to kill Padmé on Coruscant, Zam Wesell was, initially, a male character, then female, an alien, and at last, a shape-shifting Clawdite.

"George wanted a female bounty hunter like Boba Fett, but we wanted to stay away from a full-face mask," says Doug Chiang. "It was important to see her eyes, so we knew she was female. The face veil was the solution." Later, the approved design was turned into a 3-D sculpt and handed off to ILM.

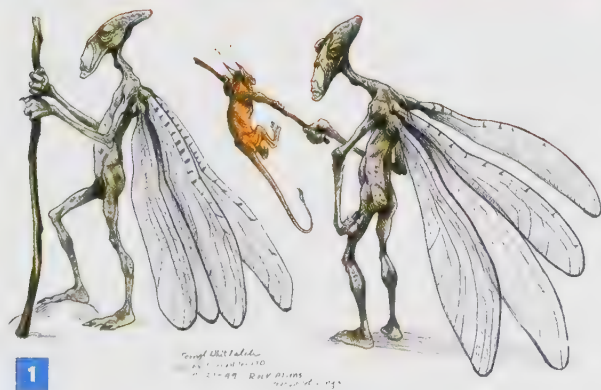
The character appears as both human—played by Australian actress Leeanna Walsman—and a digital alien. The latter was created by mapping a series of 3-D shapes onto Walsman's face to simulate Zam's reversion to her original Clawdite form.



GEONOSIANS

APPEARANCE: *Star Wars: Episode II Attack of the Clones*

MOVIE MAKING MAGIC METHOD: CGI



When it came to the look of the wasplike Geonosians, George Lucas asked Doug Chiang to dust off some of his unused favorite designs—those for the original Neimoidians from *The Phantom Menace*.

"That design was too good not to use," says concept artist Dermot Power. "Doug emailed me a picture Iain [McCaig] had done of the Geonosians with the original Neimoidian face, and I went from there."

Lucas wanted there to be a distinction between the upper-class Geonosians and the working class—on par with ant and termite colonies. The upper class would have wings and be able to fly, while workers would be wingless

drones. In addition, Lucas wanted their bodies to be rocky in texture—like the surface of their planet—and to blend in with their environment.

Once the Geonosians' look was approved, full-scale busts were created and given to ILM for digitizing.

Since their design was based on wasps and termites, Rob Coleman used insects for reference when animating the CG characters. "They have wasplike legs hanging down when they fly and double sets of wings that we based on dragonfly wings," he explains. "We discovered dragonfly wings don't really move up and down that much—they hover. [So] we used that for scenes in which the Geonosians are panicked. When they're moving more slowly, we patterned that off of moths."

1 Concept sketch by Terry Whitlatch

FORCE FACT

When developing the Geonosians, Lucas gave Chiang's design team a jar of live termites taken from his home, which was besieged by the insects at the time.

GEONOSIAN ARENA CREATURES

APPEARANCE: *Star Wars: Episode II Attack of the Clones*

MOVIEMAKING MAGIC METHOD: CGI

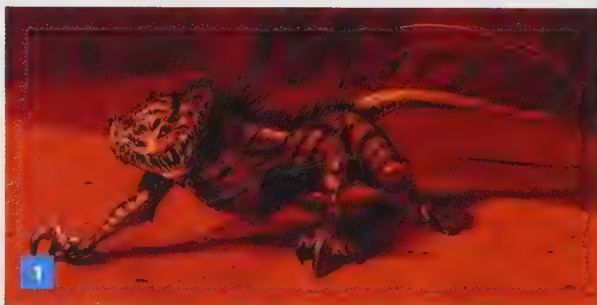


Toward the end of *Attack of the Clones*, Obi-Wan, Anakin, and Padmé are sentenced to fight to the death against a series of monsters in a Geonosian arena.

"In designing the execution arena creatures, George [Lucas] requested three distinct creatures, each with its own unique killing ability," recalls Doug Chiang.

The first was the **nexu**, a low-crouching predator with four red eyes, quills, sharp teeth and claws, and a long tail. "The nexu wanted to be fast, catlike, agile," says Chiang, "so we combined a giant rat with a tiger beast and a mouth full of teeth."

Working from designs by concept artists Dermot Power and Iain McCaig, sculptor Robert E. Barnes developed the nexu, a lionlike creature, to which he added primate arms and gigantic claws since it would be required to climb. "I was thinking of a mutated hybrid of human and feline energy, which was a very disturbing image in my mind," Barnes says.



1 Initial nexu concept illustration by Robert E. Barnes

2 Nexu model



The second creature was the **reek**, “our bison bull crossed with a rhino and a triceratops,” notes Chiang. “George wanted a brute force beast.”

A large thick-skinned, horned quadruped, the reek’s initial designs were inspired by a *Placerias*, a stout, four-legged, tusked dinosaur from the early Triassic period that Lucas took a shine to. But as the design evolved, the reek developed into a hulking creature with a scarred dinosaur hide and rhino-like characteristics. A tall, central horn was added so that Anakin could wrap his chains around it when trying to control the creature.

The third creature was the **acklay**, a giant, six-legged, reptilian crustacean, reminiscent of a lobster or crab, with razor-sharp claws and teeth. “George wanted a mythological creature, our *Star Wars* griffin,” says Chiang. “He

thought it would be interesting to mix a crab, lizard, and a praying mantis.”

And so Lucas asked Iain McCaig to combine a velociraptor with a praying mantis before Barnes took over. “When I was sculpting, it was fun to visualize what these creatures would do,” says Barnes. “I pictured the acklay as the embodiment of chaos.”

Wrinkled fruit and vegetables provided the inspiration for its skin. “I’m always looking for textures for molds or as impressions in clay,” continues Barnes. “I dried some

- 1 *Concept illustration of Anakin on a reek by Ryan Church*
- 2 *Creating CG version of a reek based on model*
- 3 *Early concept sketch of an acklay by Iain McCaig*
- 4 *Model of an acklay*



spiky melons and used the fibrous texture for some of these surfaces."

When it came to building the creatures, Lucas was determined to bring them to life digitally. Barnes and Michael Murnane sculpted maquettes that served as the basis for ILM's computer models.

"The arena beasts were outrageous designs, but were workable in terms of animation," reflects ILM's Rob Coleman. "I was never worried about the reek, which was big and muscular and well designed. I was a bit more worried about the nexu because of its huge claw. In the maquette,



he was very low, almost like a hunting cat, [so] we had to lift him to make him work. The acklay had fingers coming off its six legs. I wasn't sure what to do with them initially, but, overall, he moved like a crab."

FORCE FACT

For the acklay's roar, Ben Burtt combined a variety of noises, including wooden pallets being dragged across a soundstage floor and the sound of dolphins clicking.



KAMINOANS

APPEARANCE: *Star Wars: Episode II Attack of the Clones*
MOVIEMAKING MAGIC METHOD: CGI

Tall, elegant creatures spawned by the sea, the Kaminoans are skilled scientists that specialize in the production of clones. "They might have been something like dolphins or salamanders at one point," reveals George Lucas. "Then they got arms and larger brains and began moving out of the water, building these technological cities. They are now an advanced technological culture."

Even so, the Kaminoans are quite unlike any other alien seen in the *Star Wars* saga.

"The design is a very deliberate nod to the classic alien of *Close Encounters* [1977]," notes Lucas. "Steven [Spielberg] had done a lot of research and really drew from descriptions by people who had supposedly seen them. We wanted to do homage to Steven, but even more to that alien everyone has described. It was like, 'Oh, this is where all those aliens come from. They come from Kamino.'"

"George and I talked about how [the Kaminoans] should walk and behave," recalls Rob Coleman. "He saw them as very calm, fluid, and serene, even though they live in this austere environment with a raging storm always going on outside."



1 Concept sketch by Iain McCaig

FORCE FACT

All male Kaminoans have fins; all females are bald.



1

DOUG CHIANG'S

FIVE RULES OF CONCEPT DESIGN



One of the unique aspects of *Star Wars* is that the design team continues all the way from preproduction to post," says Doug Chiang, chief concept designer on the Prequel trilogy and *The Force Awakens*, production designer on *Rogue One*, and is currently working as Lucasfilm's head of design.

After working with Lucas for seven years on the Prequel trilogy, Chiang came up with five key design principles he applies to everything, be it creature, vehicle, or planet. "What you try to do is achieve all of those requirements, at the same time, for everything you're designing."

KEEP IT SIMPLE

"What I do now, when I design something, is try and redraw it in under thirty seconds. If I can't do it, I know the design is too complicated. It won't be easily understood."

MAKE IT RECOGNIZABLE

"If a five-year-old can draw it . . . and still have it be recognizable, then it's the foundation of a great design."

GIVE IT PERSONALITY

"George felt very strongly that all designs should have personality, not just creatures. Vehicles had to have personality, environments had to have personality. This goes to cinematic design. When you see something on the screen you have to emotionally know . . . what it's telling you. You have to build those visual languages into the design and have it be understood very quickly."


MAKE IT BELIEVABLE

"Design something that's grounded in reality so it looks real . . . [U]ltimately, you don't want the audience to question what they're seeing. You want them to be immersed in the movie and carried by the characters."

ADDED GEEK FACTOR

"The geek factor is the bonus one. Give it flair—that extra something that creates an iconic design that can become a toy, that everybody wants to put on their table because it's so cool. For me, it's the *Millennium Falcon*. I've always wanted that on my desk because it's such a great design."





STAR WARS

E P I S O D E I I I

REVENGE OF THE SITH

2 0 0 5

Even though this climactic installment of the Prequel trilogy was deeply concerned with the fates of its human characters, there were still a vast array of creatures on display—both practical and CG.

Dave Elsey replaced Nick Dudman as head of practical creature effects. His team created dozens of aliens for the film. Some were new to the series: Tion Medon and other Utapauns, and members of the Separatist Council. Others were familiar: blue-skinned Senator Orn Free Taa; Jedi Ki-Adi-Mundi, Aayla Secura, Shaak Ti, and Plo Koon; and Neimoidians Nute Gunray and Rune Haako. And, of course, there was a younger Chewbacca.

While *Revenge of the Sith's* practical creatures were created using the same tried and tested techniques—prosthetics, animatronics, body suits, slip-on masks and hands—used by Stuart Freeborn and Nick Dudman, Elsey's creatures benefited from increasing advancements in technology.

These made room for more sophisticated mechanics beneath the masks, allowing the faces to show an even greater range of expression. They also provided for more sophisticated lip-synching so characters actually appeared to be speaking rather than just opening and closing their mouths.

Rob Coleman's computer animation department at ILM was busy with Yoda, who this time battled Emperor Palpatine in a dazzling lightsaber duel.

Other digital creatures included Boga, a giant Komodo-style varactyl; Mustafarian lava fleas, hard-shelled arthropods that skitter across their planet's volcanic surface; the Felucian ground beetles that carry clone troopers into battle; a swarm of dactillions, carnivorous flying reptiles native to Utapau; and the alien medics who deliver babies Luke and Leia on Polis Massans. All of which helped make *Revenge of the Sith* a fitting finale to the Prequel trilogy.

Concept illustration of Boga by Erik Tiemens

VARACTYL

APPEARANCE: *Star Wars: Episode III The Revenge of the Sith*

MOVIE MAKING MAGIC METHOD: CGI

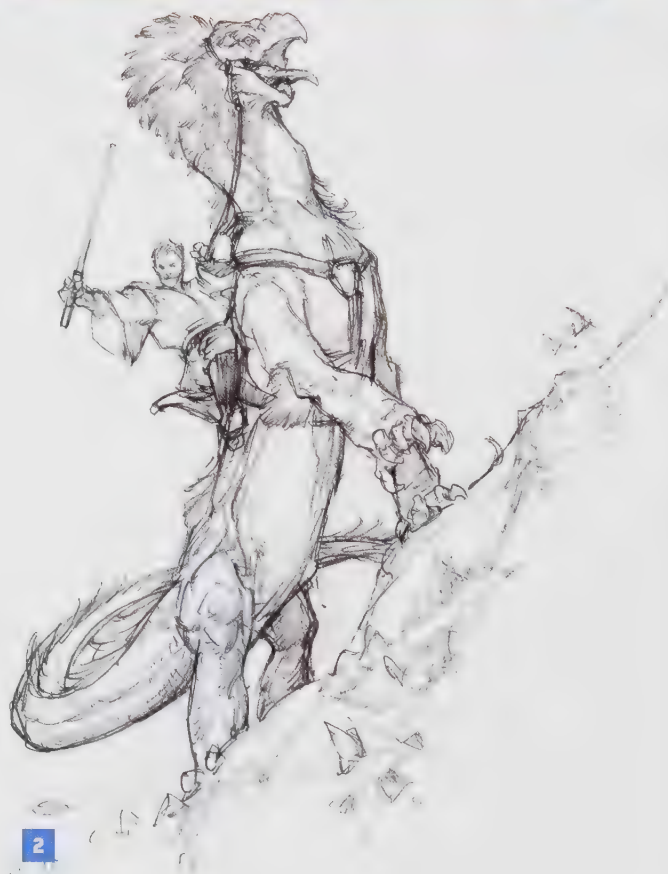


Boga, the giant Komodo dragon–style varactyl ridden by Obi-Wan as he chases down General Grievous on Utapau, was designed by ILM’s art department.

“We knew we were going to get pretty close to him [in the film], so we spent a lot of time detailing the head, giving the eyes reflective and specular qualities that would really make them pop,” explains ILM look development supervisor Kevin Reuter.

Rob Coleman’s digital animation team managed to breathe both character and emotion into the CG creature by controlling the movement of its feathers. “There’s a sweet moment where Obi-Wan goes to pet Boga, and it lowers its head and smooths its feathers so it can receive the pat,” Coleman says.

“If he stretched his neck and tail out he’d be almost fifty feet long,” notes animator Glen McIntosh. “I tried to create poses that felt like Boga was a very fast animal. The tricky part was making him fast enough to catch Grievous’s speeder while maintaining the weight and physics of a creature with that much mass.”



- 1 Concept illustration of Anakin on a lizard creature by Robert Barnes
- 2 Sketch of Boga gestures by Sang Jun Lee

TION MEDON

APPEARANCE: *Star Wars: Episode III Revenge of the Sith*

MOVIEMAKING MAGIC METHOD: Prosthetic makeup

Tion Medon was the Port Administrator of Pau City who assisted Obi-Wan in *Revenge of the Sith*. Six-and-a-half feet tall with lined, gray skin, red-rimmed eyes, and sharp fingernails and teeth, the gaunt Pau'an is an intimidating presence!

But, as Bruce Spence, who plays him, says, looks can be deceiving. "I loved the contradiction of the rather threatening nature of his facial features with the calmness of his inner character; a reminder that we should never judge a book by its cover."

Initially, it was undecided whether Medon and the inhabitants of Utapau would be created with practical makeup effects or CG. In the end, they were created using both methods, but Medon was always designed to be played by a performer wearing prosthetics.

"The makeup took over four hours to put on and just over an hour to get off," says Spence. "[And] there were hands to be made up as well. But I loved the makeup. I loved the fact Tion Medon's face gave the impression of someone who could well be primitive and cruel, but his inner character was exactly the opposite. The great thing about prosthetics today is they move with your face, whereas the old ones were much like wearing a mask—almost nothing moved. With Tion Medon, I could grimace, smile, sneer, and it would translate through the prosthetic."



1




- 1 Model of Tion Medon head
- 2 Bruce Spence in full costume

FORCE FACT

The Grand Inquisitor in the animated series *Star Wars Rebels* is also a Pau'an.





STAR WARS

E P I S O D E V I I

THE FORCE AWAKENS

2 0 1 5

After the release of *Revenge of the Sith* in 2005, most fans believed George Lucas when he said there would be no more *Star Wars* movies.

Then in late 2012, Lucas sold Lucasfilm to The Walt Disney Company, giving them the right to make more *Star Wars* movies. A new trilogy was announced immediately—beginning with *The Force Awakens*, which would continue the Skywalker saga. A series of standalone movies was planned as well.

J.J. Abrams, creator of *Felicity*, *Alias*, and *Lost*, had successfully rebooted *Star Trek*, another beloved space franchise, in 2009 and was brought on board to direct the new film.

When it came to creating the creatures for *The Force Awakens*, Abrams was determined to use the same practical approach that Lucas had used for the original trilogy. That meant fewer digital effects and more people in suits.

To design the creatures for *The Force Awakens*, special-effects artist Neal Scanlan employed a team of concept artists who “did hundreds of very loose sketches, pencil drawings, very free, very unfinished.” Each design had to follow certain rules.

Wherever possible, Scanlan’s concept artists would try to use nature as their starting point. “It helps people believe that it’s not totally from your imagination . . . It is something we can relate to, because it’s derivative of our world, not of some other galaxy or planet.”

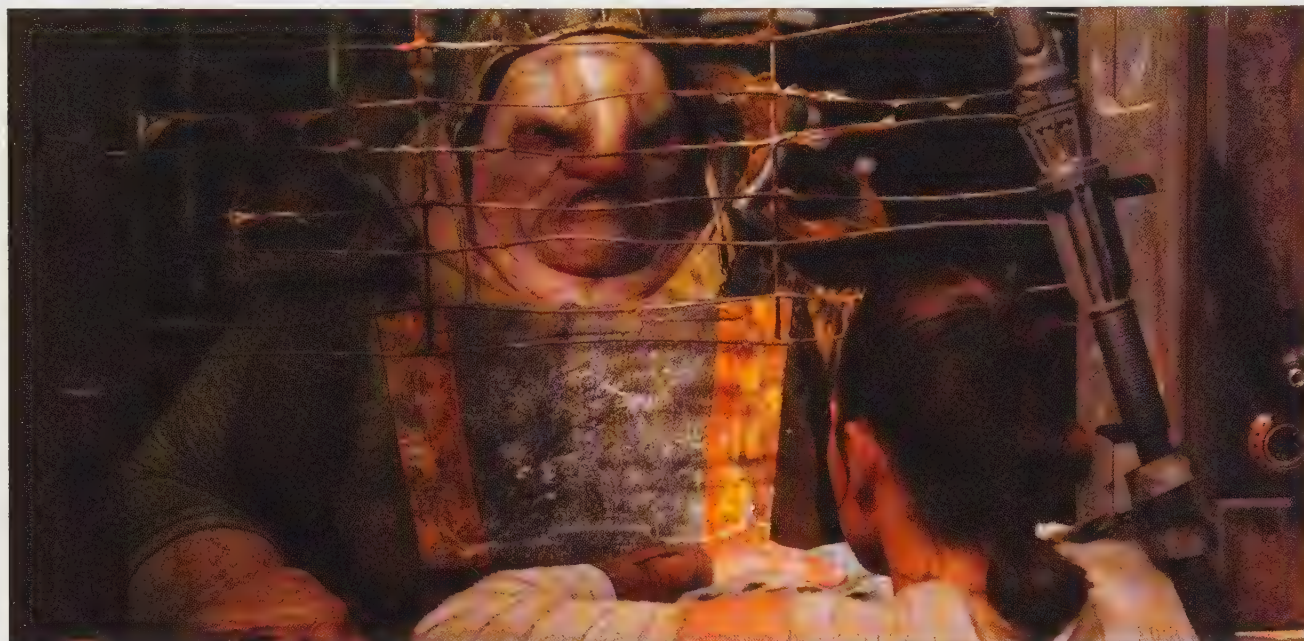
When it was time to build the creatures, the plan was to make everything practical wherever possible, using masks, prosthetic makeup, and puppetry. But there were a couple of creatures—Maz Kanata and the rathtars—that had to be computer generated.

In the end, Scanlan’s creature shop created more than one hundred different monsters for *The Force Awakens*, from simple hand puppets to the giant Grummgar that required up to ten operators to bring to life.

Production illustration of market-gang boss by Matt Allsopp

UNKAR PLUTT

APPEARANCE: *Star Wars: Episode VII The Force Awakens*
 MOVIEMAKING MAGIC METHODS: Prosthetic makeup, CGI



The blobfish-like look of Unkar Plutt was an idea of J.J. Abrams's daughter, according to senior sculptor Ivan Manzella. He took her notion and created the dour Jakku scrap dealer with whom Rey trades salvage for food.

Unkar was played by British actor Simon Pegg, wearing a silicone prosthetic that was glued to his face, a body suit, a bulky costume, and fake hands. However, due to design changes and the extreme limitations of facial performance, in the final film, the practical effect was replaced with a CG performance.

Unkar's head was made of three separate prosthetic pieces—cowl, neck, and chin—that were glued to Pegg with medical-grade adhesive. He also wore a pair of silicone gloves. "[The prosthetics] are very, very soft, softer than our skin," says Scanlan. "So when Simon moves his mouth, his eyebrows, or his nose, it's translated through to the makeup."

To further sell the illusion, Pegg's makeup was digitally tweaked in postproduction. Unkar's eyes were stretched apart and his mouth was widened "to make it feel completely devoid of being human," explains Scanlan.

"We get the best of both worlds. Simon gets to play the role. Everybody



gets to act with him. But to make it something we haven't seen before, we can use digital technology to enhance our makeups."

- 1 "Junk Boss Full Body," concept illustration by Jake Lunt Davies
- 2 Simon Pegg in costume before the head is attached

FORCE FACT

Since Pegg's makeup required up to four hours to apply, the three-piece version was only used for scenes filmed in the studio. A simple pull-on mask, which could be applied and removed very quickly, was used on location.



CONSTABLE ZUVIO

APPEARANCE: *Star Wars: Episode VII The Force Awakens*
MOVIEMAKING MAGIC METHODS: Costume, Animatronic mask



Neal Scanlan's creature crew designed a number of aliens for the Niima Outpost sequence on Jakku, based-on nomadic tribes from around the world. "You would only be able to have contact with their eyes because the rest [of them] is completely covered to protect them from the heat and the sun," he explains. "It's about pressing the point that you can communicate with somebody just by seeing their eyes. The eyes are the windows to the soul, and in many ways these creatures have either hidden behind this mask or have been forced to by circumstance."

The Constable of Niima Outpost, Zuvio, has a feline-like face that was a very simple, animatronic mask worn by Adonis II Librel, a local extra. "Zuvio wasn't one of what we call our 'featured characters,'" says Scanlan. "They're part of our world, and so we only bring them to life enough to sustain that feeling for that period."



- 1 Actor in costume wearing animatronic mask
- 2 Animatronic mask on set

HAPPABORE AND LUGGABEAST

APPEARANCE: *Star Wars: Episode VII The Force Awakens*

MOVIE MAKING MAGIC METHOD: Puppetry



To create the giant **happabore**, seen drinking from a watering hole at the Niima Outpost on Jakku, Neal Scanlan took a different approach: He drew inspiration from theatrical productions such as *War Horse* and *The Lion King*, which feature huge puppet animals.

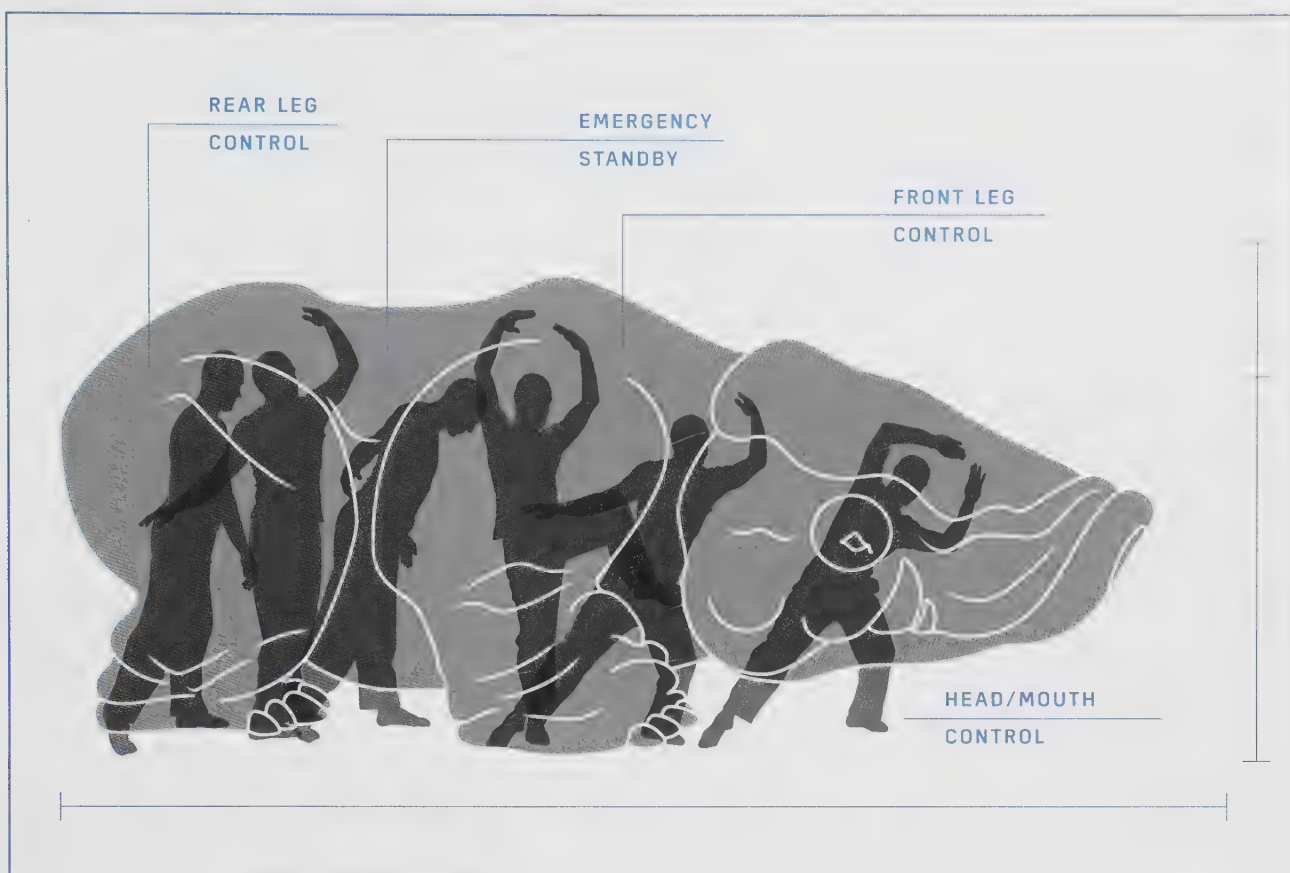
"[The puppets are] very lightweight and have four or five people on the stage making them come to life," says Scanlan, who wondered if it was possible to do something similar for film—to create more of a performable prop, with people inside it. "The happabore is that idea taken to almost the limit. The happabore was quite an innovative puppet."

Scanlan started by stringing six people together—one person in each leg, one in the head, and a sixth inside



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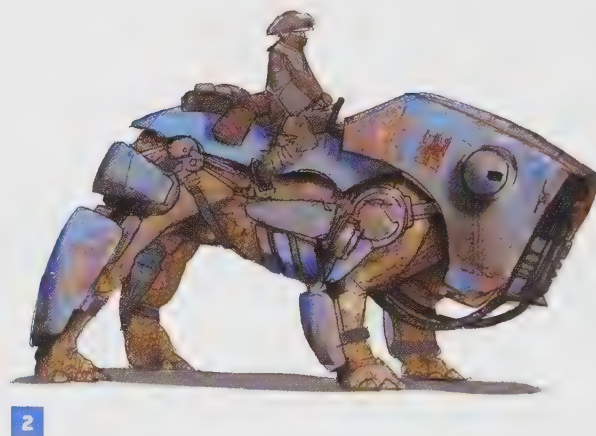
the body when needed. After choreographer Paul Kasey trained the six to move like a beast, Scanlan's team added a spine between the front and back legs, then a rib cage, and part of a skull—slowly building the creature on top



of the performers. "We fabricated it from nothing, adding foam, in sheets, to create the shape, then very thin rubber on top of that. Bit by bit, this thing got bigger and heavier, but it continued to be able to move." The final puppet measured twenty feet long, fifteen feet wide, and roughly eight feet tall.

Scanlan was proud of what his team accomplished with the happabore, and he used the same basic construction principle to create the **luggabeast**, the cybernetic

beast of burden on Jakku. But this time there were just two people inside. "The other way of doing it would have been a very heavy, very complex animatronic version, but those don't necessarily do what the human body can do. When you combine human bodies together, suddenly you have something very special."

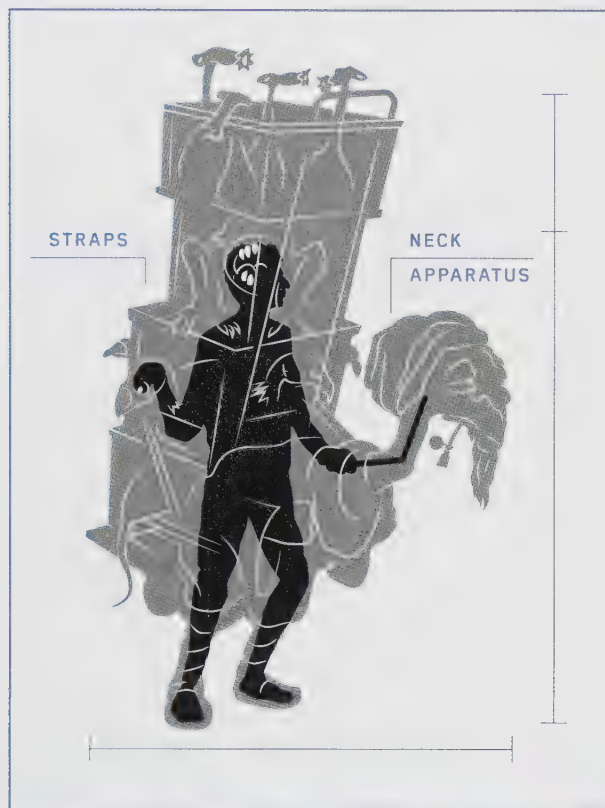


- 1 *Happabore concept sketch by Jake Lunt Davies*
- 2 *Luggabeast concept sketch by Jake Lunt Davies*

BOBBAJO

APPEARANCE: *Star Wars: Episode VII The Force Awakens*

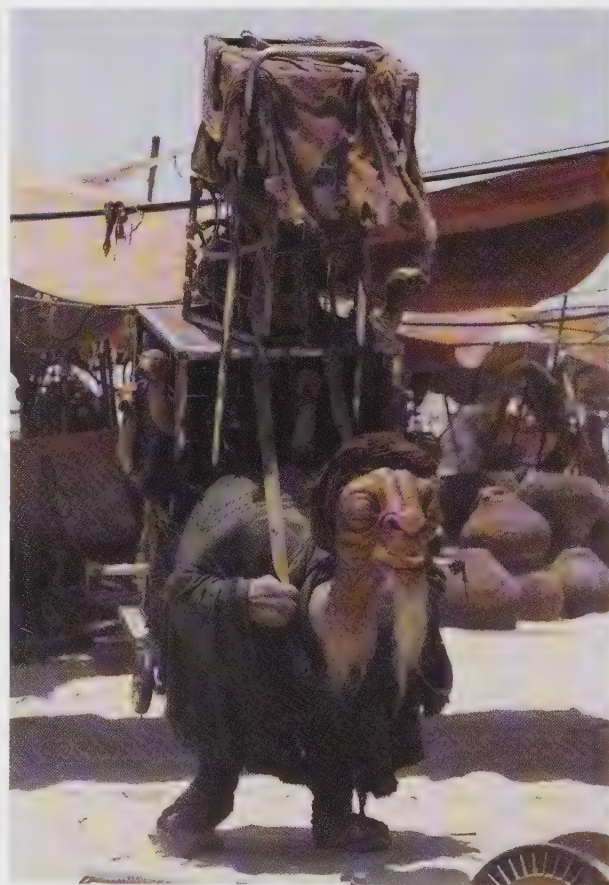
MOVIEMAKING MAGIC METHODS: *Puppetry, Costume, Animatronic head*



Bobbajo, known as the Crittermonger and a common sight in Niima Outpost, was inspired by the old-fashioned contraption that a musician would wear on his back to become a “one-man band,” playing multiple instruments at once.

“Bobbajo is an example of mixing puppetry with magic,” says Neal Scanlan. “The idea was you never knew how it worked—because that’s how magic works.”

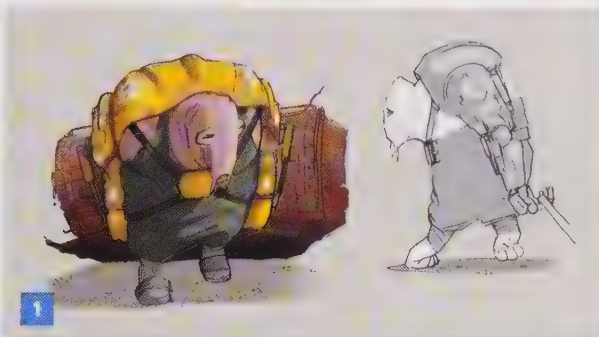
The creature was a foam latex puppet attached to the chest of an actor hidden inside the cages on Bobbajo’s back. One cage featured several animatronic birds called sneeps. Another contained a worrt, a frog-like creature. The actor’s head was inside the worrt. He could see out of the worrt’s mouth and could open it by putting his head back. One hand was tucked inside one of the bird’s heads and the other could move Bobbajo’s head. The actor’s feet and legs stood in for Bobbajo’s. Another puppeteer operated Bobbajo’s facial expression via radio control.



1 Bobbajo costume and puppeteer on set

CRUSHER ROODOWN

APPEARANCE: *Star Wars: Episode VII The Force Awakens*
MOVIEMAKING MAGIC METHODS: Costume, Animatronics



Designed by concept artist Jake Lunt Davies, Crusher Roodown is a lumbering salvager whose arms were cut off by his employer, Unkar Plutt. In their place, a set of mechanical arms, like heavy construction equipment, were grafted to his shoulders, allowing him to haul great weight.

Roodown was played by an actor wearing a large costume made out of foam and lightweight plastic. The actor's head was very low in the suit, almost at the base of the creature's neck. Both Roodown's load-lifter arms and the suit attached to the actor's back like a backpack.

"The whole suit was phenomenally light and airy because we were shooting in very high temperatures in Abu Dhabi," says Neal Scanlan. "All the materials allowed air to move in and out, and that kept the weight down. Because in those conditions you can't work for very long before you need to replenish your body with fluids and fuel."



- 1 Concept illustrations by Jake Lunt Davies
- 2 Actor in costume on set

RATHTAR

APPEARANCE: *Star Wars: Episode VII The Force Awakens*

MOVIEMAKING MAGIC METHOD: CGI



While J.J. Abrams was determined that the vast majority of the creatures in *The Force Awakens* be done practically, there were a handful that had to be computer generated, like the rathtars, the tentacle creatures being hauled by Han and Chewie when Rey and Finn first meet them.

"We always envisioned the rathtar as CG," says Neal Scanlan. "The action in the script was very fast moving, and tentacles, generally, are difficult to do animatronically without some form of assistance."

Concept artist Jake Lunt Davies took inspiration for the rathtar from an unlikely source. "Jake drew different designs and one was kind of spiky," recalls Scanlan. "I quizzed him on it and he said it was a dog's ball. It was the perfect place to start, and what ended up coming from it is very different to a dog's ball. But ultimately, in silhouette, that's what it is: a big round ball with spikes."

FORCE FACT

Rathtars share a common ancestor with Sarlaccs.



- 1 Sketch from the first batch of art Ralph McQuarrie created for *Star Wars*
- 2 Computer model of Rathtar
- 3 "Rathtar Pink," early concept design by creature-concept designer, Jake Lunt Davies

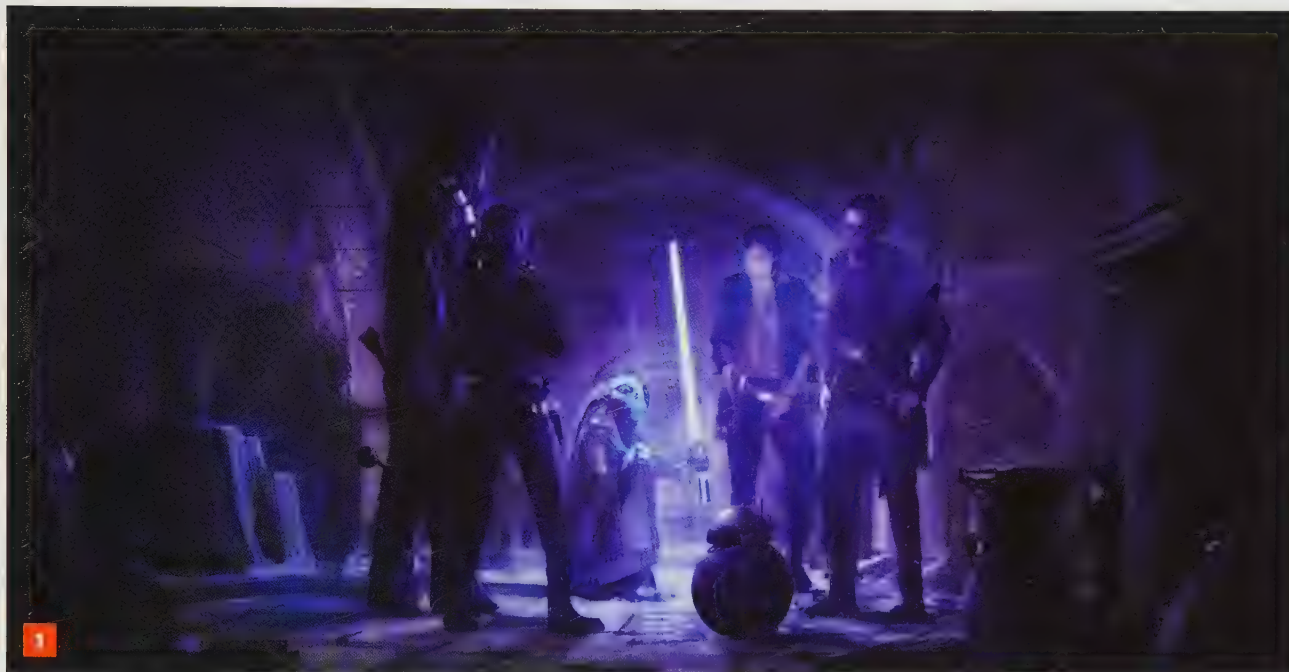




MAZ KANATA

APPEARANCES: *Star Wars: Episode VII The Force Awakens*, *Star Wars: Episode VIII The Last Jedi*

MOVIE MAKING MAGIC METHODS: CGI, Motion capture



The early *Star Wars* films had, at their center, these wonderful, old, wise, and inspiring wizard characters,” says director J.J. Abrams. “We wanted such a character, who would make you laugh, who was going to be surprising and challenging, who was going to thrust the story forward and provide our characters and the audience with critical information you needed.”

Maz Kanata, the diminutive, wrinkled, thousand-year-old mystic sage was inspired by Rose Gilbert, Abrams’s small, bespectacled high school English teacher.

“When I had her as a teacher, I didn’t know how old she was,” says Abrams. “I want to say she was in her seventies, but she was probably in her sixties. But she looked the same for forty years. She was this eccentric, brilliant, inspiring, and timeless woman—full of life.”

Using a photo of Gilbert as their starting point, Doug Chiang and his team took a first crack at designing Maz.

1 *Concept illustration of Maz with Luke’s lightsaber by Matt Allsopp*

2 *Maz fortune-teller concept illustration by costume-concept artist Glyn Dillon*





"[Gilbert] wore these large glasses. It was a fascinating look, and, since she needed to be a Force-sensitive alien, we thought it might be fun to play around with that.

"We kept her pretty small, exotic," Chiang continues. "Some of the early designs were, literally, a female Yoda . . . We kept coming back to this one [look] with large eyes, and we [thought] maybe we should embrace the idea she's wearing *Star Wars* spectacles—goggles—so you have that visual connection to his teacher. There were many, many evolutions. When Neal Scanlan's creature team came on board, they nailed the design in terms of really solidifying it and getting it approved by J.J."

It was creature designer Luke Fisher who finally cracked Maz—inspired, in part, by aviation pioneer Amelia Earhart. "One day, he drew this drawing and J.J. walked in and went, 'That's it!' And it was."

Once the design was in place, Scanlan thought about how to bring Maz to the screen. "She has that Yoda-type quality. She was all-seeing, all-knowing—a character one would go to visit and have an audience with. That made us feel she would be a good candidate for a puppet. Because, similar to Yoda, we would create her environment, her props—everything about her would have been tailored to fit to this technique of puppetry."

To sell Abrams on the idea, Scanlan auditioned a number of puppeteers. "Yoda was so unique, Frank [Oz]'s voice was so unique, we didn't want to end up copying that,"

Scanlan reflects. "So we built a very simple hand puppet, and had lots of puppeteers come in."

But as the script continued to evolve, and Maz's role expanded, the idea of a puppet became less appealing. "It became apparent halfway through that process that Maz was becoming much more of an action figure," says Scanlan. "The huge limitation of practical effects is that they are typically ground-bound, either by the fact they're operated by somebody, or by technology, or because they're a person in a suit. Now she was more a candidate for CG because we needed to show her walking. The option was kept open that maybe the wide shots or long shots could be CG and the close-ups would be a puppet."

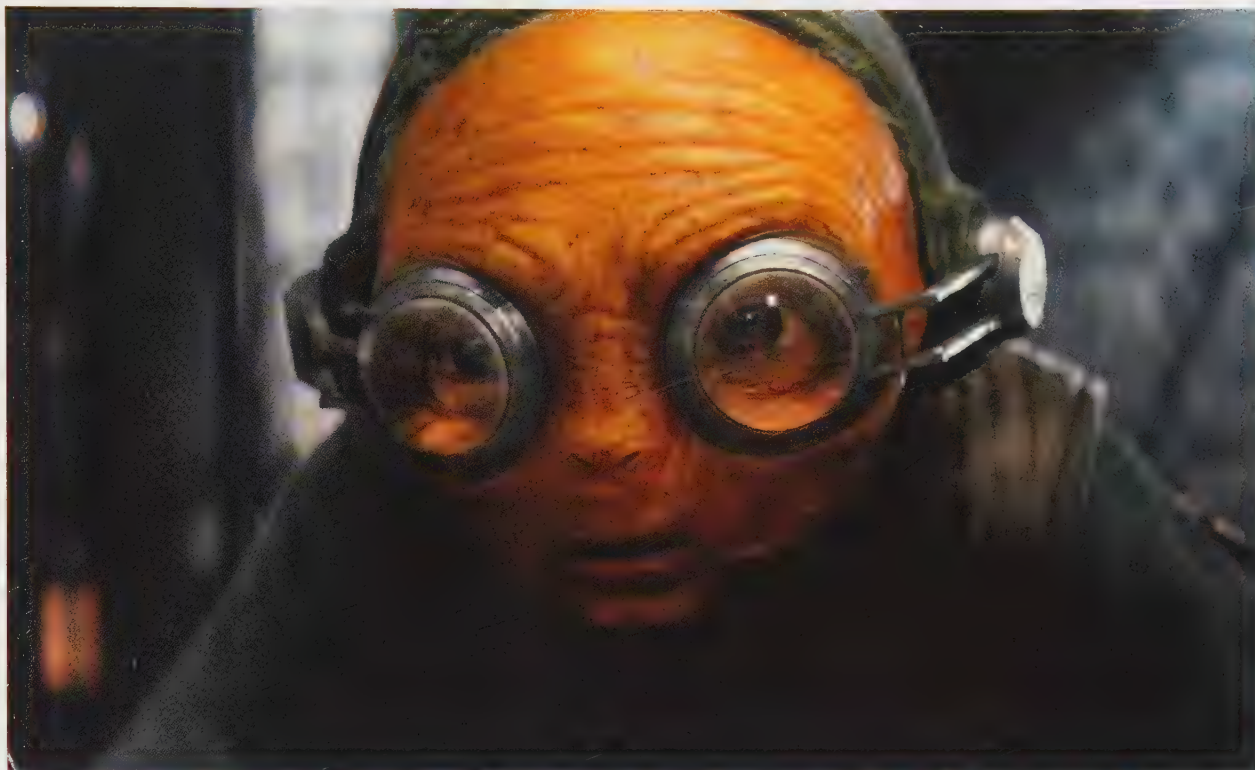
Scanlan looked into using a little person in a suit alongside a CG version. He even toyed with a hybrid physical puppet and CG character, using a facial capture performance system in which the puppet's facial performance could be driven by a human's facial expressions. In the end, it was decided to go fully digital. "There was a feeling it would be a great CG character, because we were going to do clever things with her eyes."

Even before the character's final design was approved, Abrams had cast Lupita Nyong'o to play her. Her performance would be recorded using motion-capture technology and used as the basis for Maz's movements.



1 Concept illustration by Christian Alzmann

2 Creature designer painting Maz model



Nyong'o wore a gray motion-capture suit dotted with squares that were tracked by special cameras around the stage. She also had dots on her face and wore a four-camera rig on her head to capture her facial expressions. A system called "magic mirror" allowed Nyong'o to watch herself on a monitor as her live performance was automatically translated into a CG version of the character. All of Maz's facial animation and much of her body performance was keyframe animated based on Lupita's performance by the ILM animation team in London.

To create the final CG version, Nyong'o's body movements and facial expressions were combined with scans of an incredibly detailed full-size model of Maz. The model was perfect in every way, and included hair, costumes, and orange skin. Maz's eyes were blue until the animators incorporated Nyong'o's brown eyes. "So the character retains some of Lupita's quality," explains visual effects supervisor Ben Morris.



MAZ'S CASTLE CREATURES

APPEARANCE: *Star Wars: Episode VII The Force Awakens*

MOVIEMAKING MAGIC METHODS: *Puppetry, Animatronics, Costumes, Prosthetic makeup*



Located on the planet of Takodana, on the shore of Nymeve Lake, Maz Kanata's castle is a home away from home at the fringes of the galaxy for pirates, smugglers, spies, and all manner of aliens—much like the cantina in *A New Hope*.

Grummgar, the largest of the bunch, was based on an idea of director J.J. Abrams. "J.J. said, 'Wouldn't it be great if there was this big bouncer guy at the door?'" recalls Neal Scanlan. "We responded and made a maquette of him, and J.J. said, 'Yes, let's do it for real.'"

For Scanlan's crew, Grummgar was their Jabba. A massive rod puppet, Grummgar's body was sculpted out of polystyrene, while all the visible elements—head, hands—were made of foam latex.

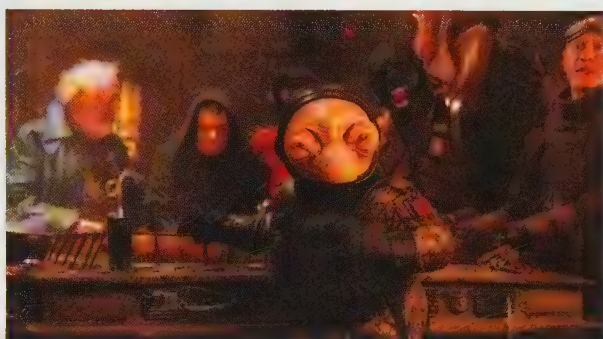
Inside the giant creature were six or seven puppeteers, operating the head as a hand puppet and moving his arms with their own. Another person was inside the chest, lifting it up and down, making it breathe, while a further puppeteer moved his legs via rods.

Only Grummgar's head was animatronic, with his eyes, face, and mouth all operated by radio control.

"He took us about four weeks to make," says Scanlan. "Again, he's a very simple puppet; he lives by the fact you can put your hands inside and make him move."



- 1 *Concept illustration of the interior of Maz's castle by Thom Tenery*
- 2 *Concept illustration of Wollivan by Ivan Manzella*
- 3 *A maquette for one of the Hassk Triplets with sculpted hair by Ivan Manzella*
- 4 *Full costume for one of the Hassk Triplets*



Smaller but more complicated were **Wollivan** and **Quiggold**. Inside Wollivan was Warwick Davis, who'd starred as Wicket in *Return of the Jedi*, as well as *Caravan of Courage: An Ewok Adventure*, and *Ewoks: The Battle for Endor*, and who had played several characters in *The Phantom Menace*.

"Wollivan is probably the most sophisticated puppet in Maz's castle," says Scanlan. "He's like a little vole or mole. Inside his head are about twenty servos. His snout moves, his eyes move in and out." Each movement was linked to Davis's face through optical tracking, a kind of motion-capture technology. In addition, another puppeteer, using a real-time computer performance system, was able to control even more facial expressions using a pair of joysticks.



Quiggold, the first mate of the freighter Finn tries to escape on, was played by Scott Richardson, an amputee whose artificial leg was built into the character's design. Quiggold's oversized head was made of foam latex to keep its weight down, and it contained a large number of servo motors (high-performance motors that allow precise control), that enabled the character to deliver dialogue.



Elsewhere in Maz's castle were three creatures familiar to fans of Ralph McQuarrie's artwork.

Known as the **Hassk Triplets**, they were played by three very thin men in hairy suits and simple over-the-head masks. "They were sculpted in what we call 'an expressive state'—which means they don't really do much but give you an instant read, an instant understanding of who they were," explains Scanlan. "They're rather sly and devious little devils."



Gwellis Bagnoro and her ferocious pet barghest, **Izby**, were played by two little people wearing animatronic costumes. "Arti Shah played the little old lady in her rocking chair," says Scanlan. "She was a physically costumed character with a little animatronic head; the dog was played by Kain Francis kneeling down on his hands and feet. The dog was hollow, and we put the costume on top of him. Inside were various controls, handles, or straps, so by leaning up and down, panting, and looking around, he could puppeteer the dog."

Simple hand puppets were used for **Sonsigo** and **Munduri**, a pair of blue-faced, goggle-wearing aliens. "They were played by two different puppeteers underneath a table," says Scanlan, "and during the sequence they would voice the dialogue. They were quite aggressive little characters."

1 *Izby concept art by Ivan Manzella*

2 *Gwellis concept art by Luke Fisher*

3 *Concept illustration of Sonsigo and Munduri by Jake Lunt Davies*

4 *Creatures on set with Neal Scanlan, Michael Kaplan, and J.J. Abrams.*







ROGUE ONE

A

STAR WARS

STORY

2016

When it came to the first *Star Wars* stand-alone movie, *Rogue One* director Gareth Edwards (*Godzilla* 2014) took the same practical approach to creature effects that J.J. Abrams had.

"Gareth wanted all the aliens and creatures to be part of their world, going about their business," explains creature effects supervisor Neal Scanlan. "That required a naturalistic approach to the way they moved and reacted, and also the ways we created them."

This time, Scanlan's team took inspiration from real people. "We tried to look at actors or people as a kind of role model for the creatures," he explains. "We'd look at Western films or Winston Churchill, people of power, and think, 'How can we put that familiarity/humanity into the creatures?'"

And so, Scanlan based the look of *Rogue One*'s Mon Calamari commander, Admiral Raddus, on Churchill's famously jowly face.

Scanlan appreciates that not everyone watching *Rogue One* will recognize the references. "But there will be a section of the audience, whether they're aware of it or not, who will have an emotional reaction. Like we look to nature to guide us with how an alien might be, sometimes it's worth looking at the great movie actors—because they were great. And why couldn't an alien that looks similar be just as great?"

In the end, Scanlan's crew produced forty-five different aliens for *Rogue One*—including creatures inspired by Clint Eastwood and Arnold Schwarzenegger. All but five were cut from the final film. But Scanlan is keen to reuse them in future *Star Wars* films. "There are some that will come back," he insists.

CG rendering of Bor Gullet from film

BISTAN

APPEARANCE: *Rogue One: A Star Wars Story*

MOVIEMAKING MAGIC METHODS: Animatronic head, Costume

An Iakaru fighting for the Rebellion, Bistan was inspired, in part, by iconic images of NASA chimpanzees. “The image of a primate in a spacesuit was a lot of fun in Gareth [Edward’s] mind,” says Neal Scanlan, “and the idea that he could also be a fighter for the cause was even better.”

Referred to as “Space Monkey” on set, Bistan was initially based on a capuchin monkey, although his design also incorporated elements of orangutans and gorillas. “He’s a mishmash,” says Scanlan, who added very fine feather quills to the fur to “give him a slightly more alien feel. It keeps the texture right, but it’s not an earthbound creature.”

Bistan’s pronounced teeth were made from dental acrylic, the same material dentists use for false teeth. “The teeth are very important,” says Scanlan. “When a primate pulls back his gums, it’s a way of showing emotion. You see the teeth when his battle roar comes.”



Bistan was played by Nick Kellington in a suit and an animatronic mask. “The suit and mask fitted very much like Chewbacca’s,” says Scanlan. “So it’s Nick’s eyes you see, and that makes it very real and very soulful. Nick’s performance is so dynamic. He’s such a strong performer, it breeds a second level of character into the face and makes for a great combination.”

1 *Concept illustration of Bistan in action by Adam Brockbank*

2 *Concept illustration by Ivan Manzella*

ADMIRAL RADDUS

APPEARANCE: *Rogue One: A Star Wars Story*
MOVIEMAKING MAGIC METHODS: Animatronic head, Costume



A green-skinned Mon Calamari, Admiral Raddus's look was inspired by former British Prime Minister Winston Churchill.

"Raddus was described by Gareth [Edwards], as being quite old, quite large, portly, strong personality, able to command the rebels, and be a decisive voice," says Neal

Scanlan. "We felt Winston Churchill fit that bill. So we tried to make Raddus's face have some Churchillian features. We looked at many classic photographs of Churchill during the war period, and if you flick between the two you will see the influence."

Played by an actor in a suit and animatronic mask, Raddus was a completely different sculpt from Admiral Ackbar.

"When you look at Ackbar, he's very goldfishy," says Scanlan. "Raddus is more like a pike than he is a perch. His features are stronger. His bone structure is stronger."

He was also painted a different color than Ackbar. "It was important to add a multiracial aspect to these characters. Just like in our world, [people] all come in different shapes, sizes, and colors, the idea was to expand the Calamari race. The other Calamaris in the film, the white ones [Caitken and Shollan] were more closely derived from Ackbar."

1 Concept art of Admiral Raddus's head by Martin Rezard



FORCE FACT

The actor who portrayed Raddus, Paul Kasey, watched a number of Churchill's wartime speeches to ensure the character echoed the politician's body language and the way he addressed a mass audience.

PAO

APPEARANCE: *Rogue One: A Star Wars Story*

MOVIEMAKING MAGIC METHODS: *Costume, Animatronic head, Prosthetic makeup*

A Drabatan from the amphibious planet of Pipada, Rebel commando Pao's design was inspired by nature. "If you look at reptiles, frogs, and toads, when they open their mouths, they reveal this enormously wide and very deep thing," says Neal Scanlan. "Gareth [Edwards] loved the idea that, as Pao went into battle, he would scream his battle cry and have this wide mouth."



In contrast, Pao's eyes were deliberately small. "Gareth really liked them being quite subdued, shadowed almost, in this very insular face. But the trick to him was this transition between a character who seemed to be very introverted to suddenly revealing his full heroic nature."

Puppeteer and performer Derek Arnold was the man inside Pao's suit and animatronic head. Scanlan's team took a cast of his mouth and effectively sculpted Pao's mouth to fit his. "The inside of Pao's mouth is partly animatronic and partly real," explains Scanlan. "When Pao's mouth opens, you look straight down the back of Derek's throat, and it seems like the creature has a very, very deep throat. It's incredibly real because it's the performer's mouth on the inside. They both roar at the same time."



1 Early concept sketch by Jake Lunt Davies

2 Concept illustration by Adam Brockbank

MOROFF

APPEARANCE: *Rogue One: A Star Wars Story*
MOVIEMAKING MAGIC METHODS: *Costume, Animatronic head*



Conceived as the offspring of a Wookiee and a wampa, Moroff was Neal Scanlan and Gareth Edwards's attempt to introduce more furry characters into the *Star Wars* universe.

The furry crossbreed was played by seven-foot-one actor-stuntman Ian Whyte wearing a muscled suit made of soft fabric and foam that changed his body shape into

"something bigger, broader, more thickset, with much more powerful arms and legs," Scanlan explains. Over that, Whyte wore a furred suit made from knotted hair tied into a flexible backing. "It fits him like his skin, so as Ian moves, the muscles move, and the fur suit does the same."

Whyte also wore a skull cap on which Moroff's animatronic head rested like a helmet. "A zip goes around the neckline and down the back, so Ian steps into him, puts the head on, connects the skullcap. Then we zip him up round the neck and away we go."

The suit included a pair of large, rubber wampa-like feet, with lifts to make Whyte even taller—taking the creature to about seven feet seven inches. To top it off, Whyte wore a set of gloves. All Moroff's facial expressions were controlled by an off-camera operator via radio control.



1 Early concept illustration by Ivan Manzella

BOR GULLET

APPEARANCE: *Rogue One: A Star Wars Story*
MOVIEMAKING MAGIC METHODS: CGI, Animatronics

A bulging, mind-reading octopus-like creature used by Saw Gerrera to torture Bodhi Rook on Jedha, Bor Gullet was designed as a “phenomenally intelligent, spiritual [creature], with almost telepathic powers,” notes Neal Scanlan. “But he was restricted by his physicality and needed to have his life sustained by machinery. He sat in a chair that assisted him in moving around.”

But as the script changed, so did Bor Gullet’s part. “It became slightly different. Bor was in a cell, used to interrogate people. The role is still there, but much diminished to what the original scene was.”

Scanlan’s crew built Bor Gullet as a full-size animatronic made out of fiberglass and silicone and weighing two tons. The mechanical puppet’s body was six-and-a-half feet high, and eight feet in diameter, not including tentacles. “We called him a blancmange, like jelly, because he wobbled,” says Scanlan. “He had this device at the back, like a large aquatic tank, attached to him. It was a filtration system to process the proteins and things that keep him alive.”

On set, Bor Gullet required more than a dozen operators inside and out. One person was inside his head moving the eyes, making them blink. Someone else moved the head. Another person was in charge of moving the body. Others moved the tentacles.

“He was a challenge to make,” continues Scanlan.

“He was a very heavy animatronic, and it took a lot of performers. But, unfortunately, things change.” In the end, the puppet was a mixture of CG and practical effects, though it was mostly CG. “I think there’s one shot of a [puppet] eyeball in [the movie].”



1 Concept illustration by Ivan Manzella



BENTHIC

APPEARANCE: *Rogue One: A Star Wars Story*

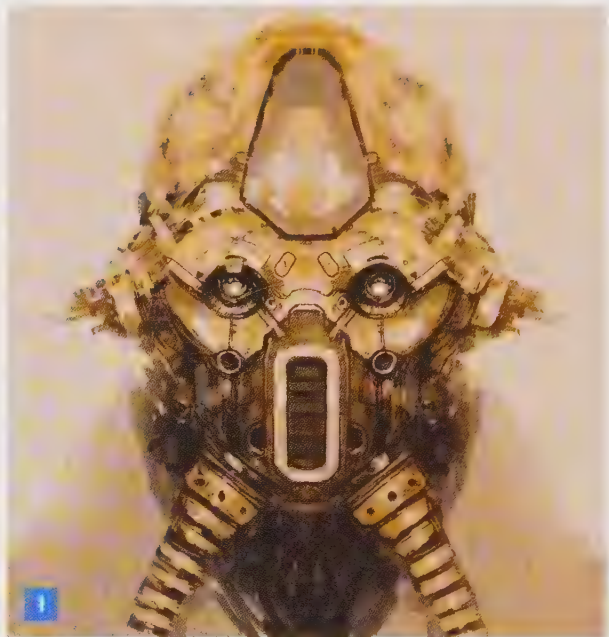
MOVIEMAKING MAGIC METHOD: Costume



Benthic, also known as Two Tubes, is one half of a duo of identical mercenary pilots that are part organic, part machine—his “eggmate” is called Edrio. “No one really knows whether they’re wearing a mask as a breathing apparatus for a creature that sits below, or whether you’re seeing part of the alien, and it’s the tech that allows it to exist,” says Scanlan. “Nor did we try to pretend to know. That’s what makes him intriguing—you’re not really sure what you’re looking at. That’s very much a *Star Wars* thing, using the organic real world and combining it with technology—some of it old and familiar. If you’re doing a more futuristic film, one tends to invent that technology. We’re trying to make the technology look like something you’ve seen before.”

“Their faces are very still, very emotionless, and seem to have a presence all of their own,” explains Neal Scanlan. “Two Tubes is part of that. He’s become iconic in his own way, the same way Boba Fett did. Neither articulate their faces, but there’s something striking and memorable about their design. They allow their faces to do the talking. That’s what Two Tubes is designed to do—to be scary and commanding.”

Benthic performer Aidan Cook wore a simple pull-over mask that did not feature any articulation.



FORCE FACT

The inspiration for Two Tubes's machinery was World War I and II gas masks, as well as masks used by scuba divers.





STAR WARS

E P I S O D E V I I I

THE LAST JEDI

2 0 1 7

When writer-director Rian Johnson was tapped to helm *The Last Jedi*, he had a very clear vision for the creatures. He communicated his vision to Neal Scanlan, creature supervisor for the film.

"The direction I gave Neal," recalls Johnson, "was to always mix an element of grotesque with beautiful."

As a result, the movie teems with weird and wonderful aliens, including the adorable porgs and the creatures of Canto Bight.

Like J.J. Abrams and Gareth Edwards before him, Johnson was determined to create as many creatures using practical effects as possible. "CG is incredible," he says, "but nothing looks as real as a real thing."

Which is why, for the return of Yoda, Johnson decided to bring back the puppet version of the Jedi Master. That meant bringing back Frank Oz, Yoda's original voice and puppeteer.

"One of the most magical memories of the shoot was being there with Mark [Hamill] and Frank," recalls Johnson. "It was just extraordinary seeing those two work together. And it's pretty incredible to look at the screen and recognize the Yoda you loved from *Empire*."

"Finn Following Shard Foxes Version 02B," concept illustration by Aaron McBride

PORGS

APPEARANCE: *Star Wars: Episode VIII The Last Jedi*

MOVIEMAKING MAGIC METHOD: Puppetry



The inspiration for the porgs came from Rian Johnson's first visit to Skellig Michael, the island that stands in for Ahch-To, the rocky outpost on which Luke has exiled himself.

"The island was covered in puffins," Johnson recalls. "You literally had to watch your step to make sure you weren't stepping on them. They were hilarious and felt like part of the island. So I thought, 'We have to figure out what the *Star Wars* version of puffins are.' Given that brief, Neal [Scanlan] and his guys went nuts."

It was creature concept artist Jake Lunt Davies who nailed the design. "The eyes are quite seallike," says Scanlan. "The head has an owl feel to it, and they have penguin-like wings."

Porgs are mainly black and dark brown in color, with creamy white bellies and chins and flecks of yellow ochre and blue around the eyes and face. The one that Chewbacca befriends, however, was designed to more closely resemble the Wookiee. "Nearly all porgs look the same, and he stands out because he doesn't," says Scanlan.

Once the final design was approved by Johnson, Scanlan's team began sculpting and casting ten to fifteen porg



puppets out of polyurethane foam rubber, with wire feet to help them stand. These were covered with duck and chicken feathers that had to be applied one at a time. The puppets were operated by rods attached to their heads and bodies. Their webbed feet were sprung so they could bounce up and down. "Using just two rods, you can bring this little bird to life," says Scanlan. The heads were operated via a combination of cables that ran along the rods to the puppeteer and radio control.

For most scenes, it would take four people to operate each porg. Puppeteers were dressed in all green so they, along with the rods, could be digitally removed from the shots.

During filming, it became clear that digital versions of the porgs would be needed in addition to the animatronic versions in order to expand the range of storytelling and allow for more subtle articulation of the characters' faces. The porgs seen in the film are approximately a fifty-fifty split between practical puppets and digital characters.

"I'm very proud of them," says Johnson. "Any time it was time to pull out the porg puppets on set, it was a happy day."

- 1 Early concept sketches by Jake Lunt Davies
- 2 Porg color test designs by Jake Lunt Davies
- 3 Artist putting the finishing touches on a puppet
- 4 Puppeteers watching video monitors as they work to see how the porg puppets appear on-screen

FORCE FACT

Porg movements were worked out using a simple flip-animation book drawn by concept designer Jake Lunt Davies for director Rian Johnson to review.



CARETAKERS

APPEARANCE: *Star Wars: Episode VIII The Last Jedi*
 MOVIE MAKING MAGIC METHODS: Costumes, Animatronic masks

With their fish heads and birdlike bodies and feet, the monastic Caretakers, who look after Luke during his self-imposed exile on Ahch-To, are the result of cross-species evolution. "They are very much of the land and of the sea. And somewhere along the line, DNA from a fish and a bird mingled," explains Neal Scanlan.

Designed by Ivan Manzella, the Caretakers were partly inspired by the isolated community of nuns in the film *Black Narcissus* (1947). "I thought if there are these Jedi structures, let's have this nunlike group of female fish creatures who live a monastic life on the island and keep all the Jedi structures up," explains Rian Johnson. "I wanted them to be slightly disapproving of Rey. So we had a lot of fun trying to come up with matronly faces that could look comically disapproving."

Ranging in height from four foot five to five foot five, the Caretakers were played by performers wearing muscle suits; sculpted, three-fingered rubber hands; and radio-controlled animatronic heads. While primarily a practical costume, CG leg replacements were added to give the Caretakers bird-claw feet as imagined in the original concept designs. "They were able to see through the nostrils or a place in the mouth and could talk to the person on the outside via an intercom," says Scanlan.



- 1 Concept illustration of a male Caretaker by Chris Weston
- 2 Concept illustration of a female Caretaker by Jake Lunt Davies

FORCE FACT

The faces of the male Caretakers were designed to be more weather-beaten, jowly, and whalelike, while the females were softer, like goldfish.

DIRECTING CHEWBACCA



Rian Johnson's favorite *Star Wars* character is Chewbacca.

"I think there's no more miraculous creature in most of moviedom," says *The Last Jedi*'s writer-director. "Not because of any kind of incredible puppetry or design, but the fact that it's a dog who flies a spaceship, and we take that for granted now. The fact that you fall in love with that character, and the fact that we no longer feel that's weird, is a triumph of exactly what creature design should be, which is creating characters."

In *The Last Jedi*, Chewbacca is played by Joonas Suotamo, who had been Peter Mayhew's stunt double on *The Force Awakens* and assumed the role following Mayhew's retirement.

"He worked so hard at trying to capture the essence of what Peter Mayhew did in creating the character," recalls Johnson. "But Joonas couldn't just be imitating

Peter. I would always tell him, 'You're playing a character now; you have to bring some of you into it.' And Joonas did."

To help with his performance, Johnson suggested Suotamo watch the silent films of Buster Keaton and Charlie Chaplin. "Chewbacca doesn't have a lot of facial expression. A lot of what you're communicating with is through very big gestures and very big physical attitudes. So I told Joonas to look at old silent comedies where they would use big expressions to convey 'I'm sad' or 'I'm happy.' You have to get up to that level of pantomime in order to make it read under all that fur."

While directing Chewbacca was "surreal," hugging him was even weirder, says Johnson. "When you hug a Wookiee, it doesn't feel like hugging a stuffed animal or a bear; it really does feel like hugging a dog. Which was a strange discovery."

FATHIERS

APPEARANCE: *Star Wars: Episode VIII The Last Jedi*
 MOVIEMAKING MAGIC METHODS: Animatronic puppetry, CGI



Towering, elegant creatures, the Fathiers were designed to capture the essence of what makes horses so beloved and special. “There is intelligence in a horse’s face, and a sense of wisdom,” explains Rian Johnson, who wanted the Fathiers to have “kind, gentle eyes” and the “beautiful, muscular strength of a horse” without looking exactly like one. “We didn’t want what’s anatomically equivalent to a horse. We wanted what a kid looks at a horse and loves.”

And so elements of other animals were mixed in. “The face is more lionlike, but the ears are a huge exaggeration of cats,” says Neal Scanlan. “They’re feline and equine at the same time. They have the physique of a horse but run like a cat.”

The final design came from ILM’s Aaron McBride and was given to Neal Scanlan’s department to sculpt as a full-size maquette and build as a life-size animatronic. Given the creature’s sheer size—it stands around fourteen feet tall—an armature was made from steel tubing before a team began sculpting on top using around six tons of wet clay. “It was phenomenally heavy,” says Scanlan.

This sculpt was cast, then a foam skin, inner structure, and mechanics were created. Since the Fathier puppet was only used for close-ups of its head and neck, just the top half was built on a wheeled base. A series of rods and levers allowed a puppeteer to move its head. The eyes, ears, and mouth were operated separately via radio control.

While shots of the Fathier galloping were created digitally by ILM, Scanlan’s team, alongside Chris

Corbould’s special effects department, built a full-size, hydraulic running version that formed the basis of the CG creature. The mechanical rig took a lot of time and money to create, but, in the end, it was not convincing enough to feature on-screen.

In the final film, the only practical elements left of the Fathiers are six close-up shots of the head-and-shoulders puppet.



- 1 3-D model by Aaron McBride to test size, scale, and movement
- 2 Concept illustration by Aaron McBride of Finn and Fathier
- 3 Rian Johnson directing Kelly Marie Tran and John Boyega with a Fathier
- 4 Kelly Marie Tran with a Fathier on set



CRYSTAL FOXES

APPEARANCE: *Star Wars: Episode VIII The Last Jedi*
 MOVIEMAKING MAGIC METHODS: Animatronic puppetry, CGI



During the climactic battle on Crait, Rey and company escape the clutches of the First Order by fleeing through caves and tunnels used by a sparkling species known as crystal foxes or vulptices.

"If you imagine a fox was to spend its life consuming mineral-based food such as cobalt and quartz, their fur would become crystalized," explains Neal Scanlan.

"We wanted something that felt like it made sense on a crystal planet. You needed to be able to look at them and instantly connect them with the landscape," says Rian Johnson, who was inspired by wind chimes and crystal chandeliers.

Initially, Scanlan planned to use real dogs wearing suits covered in clear drinking straws. "It worked beautifully, but Rian felt the crystalized quality wasn't being displayed enough, so we had to make crystals. Unfortunately, by the time we covered the suits with the crystals required, it was way too heavy to wear."

In the end, Scanlan's crew built an animatronic puppet for close-ups. For running shots, Scanlan provided ILM with a full-size model that was scanned into the computer to form the basis of the CG foxes. But, in the end, the quality and detail of the puppet did not match the original concepts, and in the film each of these crystal critters is fully CG.




- 1 *Early concept illustration by Tim Napper*
- 2 *Final CG renders of crystal fox*
- 3 *Concept illustration by Aaron McBride*
- 4 *Concept illustration by Justin Sweet*

FORCE FACT

For each crystal fox, Scanlan's team manufactured around thirty thousand crystals from a clear, polyurethane plastic.







SOLO

A

STAR WARS

STORY

2018

The second standalone *Star Wars* movie tells the adventures of Han Solo a decade or so before the events of *A New Hope*. In it, Han wins the *Millennium Falcon* from Lando Calrissian, flies the Kessel Run in "less than twelve parsecs," and meets a young Chewbacca for the first time. "It's a story of trust, of friendship, and ultimately of love," reveals Neal Scanlan.

Solo also features the largest number of creatures ever seen in a *Star Wars* film—around 160. Many creatures were inspired by films that influenced George Lucas when he was originally writing *Star Wars*. Others were inspired by various science fiction films, TV shows, and artwork from the 1950s and '60s.

"In those days, if something had big hands and one big eye, it was a creature, it was scary," chuckles Scanlan. "We wanted to include that charm."

"Sabacc Table Version 27," concept illustration by Jon McCoy

PROXIMA

APPEARANCE: *Solo: A Star Wars Story*
 MOVIEMAKING MAGIC METHODS: Animatronic puppetry, CGI

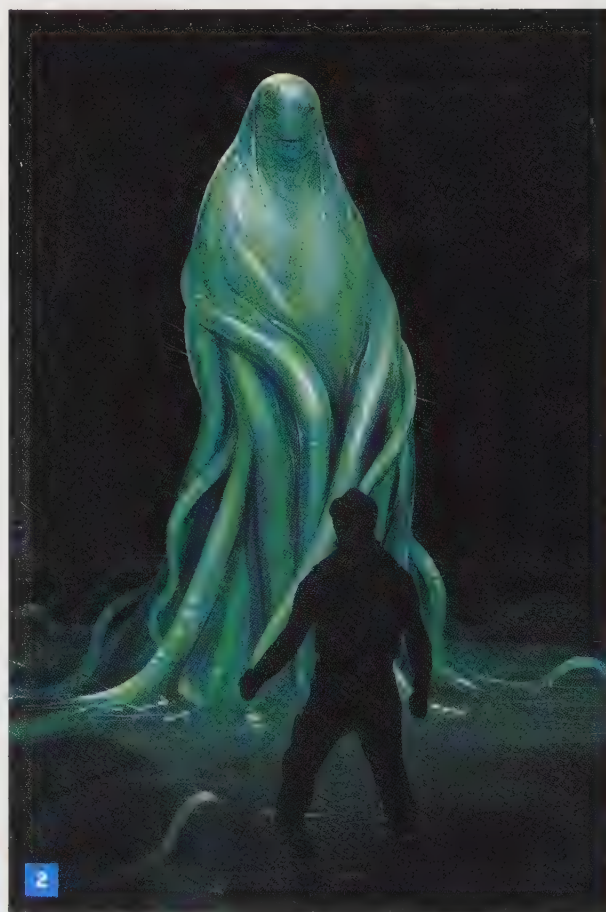


A crime boss on the planet Corellia, Proxima lives in the murky darkness of an underground pool like a serpentine Fagin, tended to by homeless children as well as two wormlike creatures.

"She is an aquatic millipede with a beluga-shark head and a great white shark mouth," says Neal Scanlan. "She has tendrils and long, gray hair that hangs rather bedraggled by her side."

Proxima had been intended to be mostly hidden underwater, much like the dianoga, the trash compactor creature in the original *Star Wars*. "The idea was, what you didn't see was more frightening than what you did. But she evolved into something bigger, grander, and more imposing, and we didn't want to hide her from the audience," explains Scanlan. "We got rid of lots of tentacles, because she was much more authoritative as this singular, powerful creature."

Scanlan's team built the visible part as an eighteen-by-four-foot foam puppet and filmed her in a tank on the 007 Stage at Pinewood Studios in England. Puppeteers worked in and out of the water to bring the creature to life using rods, wires, and radio control. Proxima could rise up out of the tank, swivel, and talk. On set, her numerous pairs of arms were operated via radio control, with ILM digitally adding more arms later as well as removing the visible rods and wires that held her aloft.



FORCE FACT

All of Proxima's interior servos and electronics were waterproof to allow the puppet to work in the water.

- 1 Concept illustration by Jake Lunt Davies
- 2 Concept illustration by Luke Fisher
- 3 Concept illustration by Luke Fisher
- 4 Costume concept design by Jake Lunt Davies
- 5 Maquette by Ivan Manzella





RIO DURRANT

APPEARANCE: *Solo: A Star Wars Story*

MOVIEMAKING MAGIC METHODS: Costume, CGI

A four-armed, two-legged, capuchin monkey-type creature, Rio Durrant is arguably the best pilot in the galaxy—he would argue even better than Han—on account of his many limbs.

Designed by Ivan Manzella, Rio was built by Neal Scanlan's crew as a puppet. But as the character evolved and was required to be more active, swinging around the interior of a spaceship and doing things a puppet wouldn't be able to do easily, Scanlan opted instead for a person in a fur bodysuit.

Inside the suit was Katy Kartwheel, a four-foot-six acrobat and gymnast whose arms operated Rio's front pair. A second set, which extended out of the suit's back, was added digitally by artists at ILM. The suit didn't have a face, so Kartwheel was able to see clearly as she undertook the role's physical demands. ILM added Rio's CG face in postproduction.

"It's a clever character, a blend of different techniques and the next stage on from Maz," notes Scanlan. "He is part practical, part digital, so you get the best of both worlds."

Rob Bredow, visual effects supervisor for the film, adds, "It's a perfect example of teamwork where we get this great physical performance from Katy and the on-set creature team, and then ILM can take over and enhance the performance only where needed. The final result is a seamless blend combining the best in artistry both from talented artists at ILM and the best practical on-set effects."



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3



4

- 1 Sculpt by Ivan Manzella
- 2 Concept illustration by Jake Lunt Davies
- 3 Illustration by Jake Lunt Davies exploring Rio's solo flying ability
- 4 Concept illustration by Ivan Manzella



AFTERWORD

For the past forty years, the *Star Wars* saga has inspired the imaginations of generations of movie fans around the world.

With its thrilling stories, wonderful characters, groundbreaking visual effects, and monsters and aliens of all shapes and sizes, George Lucas's original *Star Wars* redefined the movies, broke box-office records, and introduced audiences to a galaxy far, far away. It also helped inspire new generations of children to follow their dreams and become filmmakers.

The initial generation inspired by George Lucas's epic—J.J. Abrams, Gareth Edwards, and Rian Johnson among them—have gone on to make their own *Star Wars* movies. And those movies will hopefully inspire yet another generation of young fans to become filmmakers and contribute their own groundbreaking successes and innovative techniques to the long and storied history of special effects in cinema.

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You hold in your hands the secrets of the magic that brought the *Star Wars* saga to life. Go behind the scenes and see how detailed sketches became life-

like creatures that breathe and ooze and roar. Through diagrams and photographs, learn about the different kinds of effects, from puppetry to motion capture, that have made alien beings seem as real as anything on earth. In their own words, hear stories of how creative, hardworking teams made the impossible possible, again and again and again.

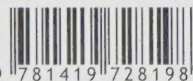
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